THE FOURTH ANNUAL AWARD FOR EXCELLENCE IN TEACHING. AN ANALYSIS OF PROCEDURE AND DATA.

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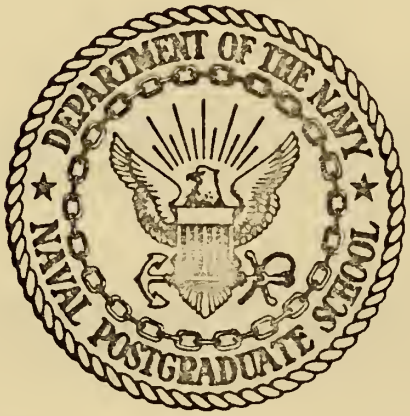

THESIS

THE FOURTH ANNUAL AWARD FOR EXCELLENCE IN TEACHING. AN ANALYSIS OF PROCEDURE AND DATA

by

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September 1973

The Fourth Annual Award for Excellence in Teaching

An Analysis of Procedure and Data

by

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ABSTRACT

The purpose of this thesis was to present the procedure and techniques used to select the fourth annual recipient of the Rear Admiral John J. Shieffelin Award for Excellence in Teaching. The data and results were analyzed and compared with the results from the previous year. Findings indicate that the best teacher in each of the eleven academic departments is being selected but that distribution of the eleven within the top twenty positions occurs randomly.

Recommendations were made for changes in the present system should it continue in use and an additional recommendation was made for the adoption of a new method of selection based on the use of student questionnaires.

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I. INTRODUCTION

In May 1969, the Superindendent of the U.S. Naval Postgraduate School directed that a committee be formed each year from among the faculty to select the recipient of an excellence in teaching award to be known as the Rear Admiral John J. Shieffelin Award. The committee was to be composed of a chairman, a secretary, and five members, all of whom would be chosen to represent a variety of backgrounds and curricula. In order to retain a degree of continuity within the committee, only four of its members would be replaced each year.

The 1973 committee consisted of the following faculty members:

G.J. Hokenson - Chairman
N. Plotkin - Secretary
D.E. Harrison - Member
H.J. Zweig - Member
J.N. Dyer - Member
R. Stolfi - Member
H.J. Larson - Member

The following guidelines for the selection process were adopted by the committee:

1. All faculty members who taught two or more course segments in 1972 were eligible to receive the award with the exception of members of the selection committee, curricular and liaison officers, and previous award winners.

2. The voting population would consist of all current students, faculty, curricular officers and the Naval officer alumni who were graduated in 1971.

3. Participation in the voting would be on a voluntary basis.

4. Care and discretion would be exercised to insure that no ranking of candidates was published.

5. For the ballot to be valid, the voter must indicate on the candidate list at least five members of the faculty with whom he is sufficiently acquainted to make a judgment.

6. Should the committee be unable to decide upon a single dominant winner, equal multiple awards would be presented not to exceed three in number.

In order to maintain complete objectivity among the selection committee it was decided that handling of all ballots and collation of all data would be performed by a graduate student who would then submit the results to the committee for its selection. The winner's name would remain secret until the award was presented at the June 1973 graduation exercises.

II. THE BALLOT

A. FORMAT

The ballot adopted by the committee for this year's polling was similar to those used in previous years but included minor modifications based on recommendations made the previous year. Students, faculty, and curricular officers each received a ballot and return envelope to which was attached a cover sheet which explained the purpose of the award and provided instructions on completing the ballot. In addition to the ballot and cover sheet, alumni received an additional cover letter from the Superintendent.[1]

The ballot was composed of four parts. Part A consisted of information useful for gathering statistics concerning voter characteristics. The voter was asked to identify his voter category, branch of service, military rank and curricular area if military or a civilian student; if a member of the faculty his rank and department were to be indicated.

Part B consisted of three blanks to be used in indicating first, second, and third choices for the award using the four-digit identification number specified in Part C.

Part C consisted of the list of all eligible faculty members. Members were listed in alphabetical order within departments and each name was preceded by a four-digit

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[1] A sample ballot, cover letter, and instruction sheet are included in Appendix A.

identification number. The number of each faculty member with whom the voter was academically well acquainted was to be circled. From this field of selected individuals, the voter was then to select from one to three nominees and place their identification numbers in the blanks provided in Part B.

Part D was an optional area in which the voter could provide remarks for supporting his first place nomination.

B. BALLOT DISTRIBUTION

Ballots were distributed to most students by placing an empty ballot in each student mail center box. NMSC students received ballots in the classroom. Alumni who were graduated in 1971 were selected to participate in the voting and their names and addresses were obtained from a data tape maintained in the computer facility. Faculty member ballots were placed in faculty mail center boxes within each curriculum office. Completed ballots were placed in the return envelopes provided and mailed to Code 55 BAL. When received, the ballots were forwarded to a central location in the Operations Analysis Department.

C. BALLOT VALIDATION

The validation process consisted of insuring that the voter's signature was on the envelope and that the identification numbers of at least five faculty members in Part C were circled. If the envelope was unsigned or less than five faculty members in Part C were identified, the ballot was considered void and eliminated from further consideration.

Write-in votes in Part B were not considered. If Part B consisted of only write-in votes the ballot was considered void. If Part B consisted of a combination of write-in votes and valid identification numbers, the write-in votes were ignored. If an identification number appeared more than once in Part B, only its first appearance was counted. Each valid ballot was given a four digit identification number for ease of handling and future reference.

Of the 1292 ballots returned, 335 were void, which is a larger percentage than occurred in 1972. The number of void ballots in each voter category and the reasons for disqualification are as follows:

	ALUMNI	STUDENTS	CURR. OFF.	FACULTY	TOTAL
Failure to identify 5 faculty members	90	165	5	15	275
Failure to complete Part B	1	41	1	11	54
Completed Part B with write-in votes	0	2	0	0	2
Received too late to be processed	2	2	0	0	4

D. TRANSFERRING THE DATA TO COMPUTER TAPE

Upon completion of the validation process, the information on each valid ballot was transferred to an IBM card in order that it could be processed by a series of prepared computer programs. The first of these was a COBOL routine called "Transfer"[2] which checked each IBM card for possible

[2] A listing of "Transfer" is included in Appendix B.

errors. The most frequent source of error would naturally arise from a typographical mistake in one of the four-digit faculty identification numbers. These numbers were assigned with this fact in mind and they were specifically devised so that a computer routine could be used to easily check their accuracy. Each instructor on the ballot was assigned a three-digit number which formed a vector. This vector was then multiplied by a fixed weighting vector to form an inner product, the last digit of which formed the fourth digit of the final identification number. For example, professor number 629, when multiplied by the weighting vector yields:

$$(\ 6\ 2\ 9\ )\begin{pmatrix}3\\5\\1\end{pmatrix} = 18 + 10 + 9 = 3\underline{7}$$

Thus, the final identification number would be 6297.

When an error was detected, "Transfer" identified the error and the ballot on which it occurred in order that it could be corrected and resubmitted. Those ballots found to be error free were transferred to a magnetic tape for further processing. This procedure was continued until all ballots were transferred to the tape.

III. STATISTICAL ANALYSIS

A. POPULATION CHARACTERISTICS

Table I compares voter response within each voter category with that response received in 1972.

Table I. VOTER RESPONSE

CATEGORY	# ELIGIBLE VOTERS	# BALLOTS RETURNED	% RETURNED FROM ELIGIBLE	% CHANGE OVER PREVIOUS YEAR
Student	1572	764	48.5	+ 2.5
Alumnus	747	407	54.5	-12.7
Faculty	305	109	35.8	- 6.1
Curr.Off.	17	12	70.5	+33.0

The figures indicate that alumnus and faculty response percentages have decreased from the previous year while student response has increased slightly and the percentage of curricular officers responding has increased substantially. However, the valid voter response figures shown in Table II indicate that this slight increase in the number of overall responses was more than negated by the considerable increase in void ballots received, (335 vs. 148). It appears that additional effort must be made to not only encourage increased voter response, but also to insure that ballots are filled out correctly.

Table II. VALID VOTER RESPONSE

CATEGORY	# ELIGIBLE VOTERS	# VALID BALLOTS	% VALID FROM ELIGIBLE	% CHANGE OVER PREVIOUS YEAR
Student	1572	554	35.2	- 6.1
Alumnus	747	314	42.1	-19.6
Faculty	305	83	27.2	- 7.2
Curr.Off.	17	6	35.3	+ 4.0

B. DISTRIBUTION OF M_i

After all ballots had been placed on magnetic tape, a second COBOL program, "Profsort"[3], was run which rearranged the data from ballot format into a statistical record for each faculty member. The program then identified the frequency distribution of M_i, the number of faculty members known by the i^{th} voter. Table III presents a frequency table of M_i. The mean of M_i = 16.1 with a standard deviation of 9.7. An interesting fact to note is that in all cases where a voter identified 55 or more faculty members with whom he was sufficiently familiar to judge as an instructor, the voter was himself a member of the faculty.

Table III. FREQUENCY TABLE OF M_i

CELL	FREQUENCY
5-9	236
10-14	266
15-19	181
20-24	137
25-29	80
30-34	28
35-39	14
40-44	3
45-49	5
50-54	2
55-59	1
60-64	1
65-69	0
70-74	1
75-79	0
80-84	0
85-89	0
90-94	0
95-99	1
100-104	0
105-109	0
110-114	1
115-120	2

[3] A listing of "Profsort" is included in Appendix B.

C. DISTRIBUTION OF N_k

Once "Profsort" had established a distribution of M_i and compiled a statistical record for each faculty member on a new magnetic tape, a third COBOL program, "Scorsort"[4] was run which provided a frequency distribution of N_k, the number of voters who knew the k^{th} professor. The mean of N_k was determined to be 53.4 with a standard deviation of 50.7. Table IV is a frequency table of N_k.

Table IV. FREQUENCY TABLE OF N_k

CELL	FREQUENCY
1-20	28
21-40	88
41-60	74
61-80	39
81-100	33
101-120	10
121-140	10
141-160	0
161-180	1
181-200	1

D. DETERMINATION OF S_k

In addition to calculating N_k, "Scorsort" calculated a numerical score for each faculty member and provided the following statistics:

X_{1k} = Number of 1st place votes received by professor k
X_{2k} = Number of 2nd place votes received by professor k
X_{3k} = Number of 3rd place votes received by professor k

Scores were calculated in the following manner:

A weighting vector $\overline{W} = (4,2,1)$ was multiplied by

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[4] A listing of "Scorsort" is included in Appendix B.

$V_{ik} = \frac{X_{ik}}{N_k}$ = fraction of i^{th} place votes to teacher K from the population that knew him; i=1,2,3; k=1,2,...

$$\text{Score} = (V_{1k}\ V_{2k}\ V_{3k}) \begin{pmatrix} 4 \\ 2 \\ 1 \end{pmatrix} = 4\ V_{1k} + 2\ V_{2k} + V_{3k}$$

For example, suppose a faculty member were known by 40 students and received four first place votes, two second place votes and one third place vote. His score would be calculated as follows:

$$V_{1k} = \frac{4}{40}\ ;\ V_{2k} = \frac{2}{40}\ ;\ V_{3k} = \frac{1}{40}$$

$$\text{Score} = (\frac{4}{40}\ \frac{2}{40}\ \frac{1}{40}) \begin{pmatrix} 4 \\ 2 \\ 1 \end{pmatrix} = .52500$$

Table V presents the scores in descending order with the corresponding values of N_k, X_{1k}, X_{2k}, and X_{3k} for each faculty member.

E. DOMINANCE

In calculating the numerical scores of each candidate, it was decided that a first place vote should be worth more than a second place vote which should be worth more than a thrid place vote. Consequently, a weighting vector $\overline{W}$ = (4,2,1) was chosen for use and the scores were calculated using these figures. However, it might be possible that some other $\overline{W}$ than the one used could be chosen which retained the relationship $w_1 \geq w_2 \geq w_3$ but this would result in a different ordering of faculty member scores.

Recall that the score of teacher K, S_k, was calculated by multiplying the weighting vector ($\overline{W}$) by V_{ik}, the vector

Table V. SCORSORT SUMMARY

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
1	1.93333	30	9	9	4
2	1.87179	39	15	5	3
3	1.65385	26	7	6	3
4	1.64103	39	12	4	8
.	1.60448	134	35	30	15
.	1.59459	37	9	8	7
.	1.58065	93	24	19	13
	1.48438	64	20	6	3
	1.42157	102	27	14	9
	1.41912	136	34	22	13
	1.35897	39	9	6	5
	1.32653	49	12	5	7
	1.31250	48	10	6	11
	1.25806	31	8	2	3
	1.22222	36	7	6	4
	1.20833	72	16	8	7
	1.20000	20	3	5	2
	1.17391	23	5	3	1
	1.12360	89	19	8	8
	1.11111	45	8	7	4
	1.10638	47	8	8	4
.	1.10219	137	25	18	15
.	1.08000	50	8	10	2
.	1.04167	48	10	4	2
25	1.03226	31	6	2	4

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
26	1.02778	36	7	3	3
.	1.02222	45	9	2	6
.	1.00000	55	8	9	5
.	0.97087	103	18	9	10
	0.93939	66	8	12	6
	0.93939	33	5	4	3
	0.93750	48	8	5	3
	0.92929	99	12	18	8
	0.91803	122	21	9	10
	0.91429	105	17	10	8
	0.91139	79	10	12	8
	0.87952	83	10	14	5
	0.87805	41	6	5	2
	0.84211	19	2	4	0
	0.82759	29	4	3	2
	0.82143	56	8	6	2
	0.80435	46	5	4	9
	0.80000	75	10	8	4
	0.79487	39	5	4	3
	0.79310	29	5	1	1
	0.78947	95	13	6	11
.	0.76364	55	4	9	8
.	0.75676	37	3	6	4
.	0.74074	27	4	2	0
50	0.73529	34	5	1	3

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
51	0.72527	91	11	7	8
.	0.71429	84	7	10	12
.	0.71233	73	9	5	6
.	0.70370	27	3	3	1
	0.68966	58	8	3	2
	0.68750	64	7	7	2
	0.67500	40	4	2	7
	0.66667	12	2	0	0
	0.66000	50	4	7	3
	0.63636	22	1	4	2
	0.63158	57	7	2	4
	0.62590	139	11	12	19
	0.62500	24	2	2	3
	0.60317	63	5	7	4
	0.60000	50	4	4	6
	0.60000	20	1	4	0
	0.58947	95	9	5	10
	0.58537	41	4	3	2
	0.58228	79	8	5	4
	0.57971	69	7	4	4
	0.57447	47	2	8	3
.	0.56757	37	4	2	1
.	0.56716	134	10	13	10
.	0.56098	41	4	3	1
75	0.55882	34	3	2	3

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
76	0.54839	31	2	3	3
.	0.54762	42	4	3	1
.	0.54286	35	3	3	1
.	0.54286	35	3	1	5
	0.54167	48	4	4	2
	0.50000	104	9	4	8
	0.50000	40	3	3	2
	0.50000	34	2	3	3
	0.50000	28	2	1	4
	0.49057	53	2	6	6
	0.47917	96	6	8	6
	0.47458	59	3	6	4
	0.46988	83	6	4	7
	0.46875	32	3	1	1
	0.46269	67	4	4	7
	0.46154	39	3	2	2
	0.45833	48	1	7	4
	0.43750	64	5	1	6
	0.43750	48	3	3	3
	0.43182	44	2	4	3
	0.42353	85	4	8	4
.	0.42308	78	5	5	3
.	0.42105	19	0	4	0
.	0.41026	39	2	2	4
100	0.40278	72	3	6	5

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
101	0.40000	25	2	1	0
.	0.39344	61	3	4	4
.	0.38554	83	3	8	4
.	0.38462	26	1	2	2
	0.38272	81	3	4	11
	0.38158	76	4	6	1
	0.38095	63	3	2	8
	0.37931	29	2	1	1
	0.36667	30	1	2	3
	0.36585	82	5	2	6
	0.36364	44	3	2	0
	0.36111	36	2	2	1
	0.35714	28	2	1	0
	0.35714	28	1	2	2
	0.35294	102	2	7	14
	0.35294	34	1	3	2
	0.34848	66	2	6	3
	0.34211	38	2	1	3
	0.34091	44	2	3	1
	0.34043	47	2	3	2
	0.33663	101	4	3	12
.	0.33333	33	2	1	1
.	0.33333	27	1	2	1
.	0.33333	24	2	0	0
125	0.32653	49	3	2	0

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
126	0.32609	46	1	4	3
.	0.32500	40	1	3	3
.	0.32500	40	2	2	1
.	0.32203	59	2	3	5
	0.31250	32	2	0	2
	0.30488	82	3	4	5
	0.30000	10	0	1	1
	0.29730	37	0	5	1
	0.29730	37	1	2	3
	0.29412	34	1	2	2
	0.28125	96	3	5	5
	0.28000	50	1	3	4
	0.27869	61	0	5	7
	0.27835	97	5	3	1
	0.27778	72	2	4	4
	0.27551	98	2	6	7
	0.27439	164	6	8	5
	0.26596	94	3	4	5
	0.26316	38	1	2	2
	0.25974	77	2	3	6
	0.25714	105	3	6	3
.	0.25641	39	2	1	0
.	0.25490	51	3	0	1
.	0.25000	84	3	4	1
150	0.25000	40	2	1	0

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
151	0.24390	41	1	2	2
.	0.22581	124	4	4	4
.	0.22222	54	2	2	0
.	0.22222	54	1	2	4
	0.22222	36	0	3	2
	0.22222	18	1	0	0
	0.22000	50	0	3	5
	0.21951	41	1	2	1
	0.21875	64	2	2	2
	0.21795	78	3	1	3
	0.21429	28	0	2	2
	0.21154	52	1	3	1
	0.21053	19	0	1	2
	0.20755	53	1	2	3
	0.20690	29	1	0	2
	0.20661	121	1	8	5
	0.20588	34	0	2	3
	0.20482	83	3	2	1
	0.20000	95	2	4	3
	0.20000	80	3	1	2
	0.20000	40	2	0	0
.	0.19853	136	3	7	1
.	0.19737	76	2	1	5
.	0.19444	36	1	1	1
175	0.19231	26	1	0	1

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
176	0.19048	84	3	1	2
.	0.18367	49	1	2	1
.	0.17241	87	2	3	1
.	0.17073	41	0	3	1
	0.16667	12	0	1	0
	0.16396	61	1	2	2
	0.16129	31	0	1	3
	0.16129	31	1	0	1
	0.16129	31	1	0	1
	0.15854	82	0	3	7
	0.15152	33	0	2	1
	0.15000	20	0	1	1
	0.14773	88	1	2	5
	0.14667	75	2	0	3
	0.14545	55	0	3	2
	0.14035	57	1	1	2
	0.13793	29	0	2	0
	0.13793	29	1	0	0
	0.13636	22	0	1	1
	0.13333	45	1	1	0
	0.13333	30	0	2	0
.	0.13043	23	0	1	1
.	0.13021	192	3	4	5
.	0.12903	31	1	0	0
200	0.12000	25	0	1	1

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
201	0.11765	51	0	2	2
.	0.11429	35	1	0	0
.	0.11250	80	1	1	3
.	0.11111	99	1	2	3
	0.11111	81	1	2	1
	0.11111	63	0	3	1
	0.11111	45	0	1	3
	0.11111	45	0	2	1
	0.11111	36	1	0	0
	0.11111	27	0	1	1
	0.11111	9	0	0	1
	0.10870	46	0	1	3
	0.10417	48	0	2	1
	0.09756	41	1	0	0
	0.08889	45	1	0	0
	0.08824	68	0	3	0
	0.08333	84	0	3	1
	0.08333	72	1	0	2
	0.08197	61	1	0	1
	0.08197	61	1	0	1
	0.07843	51	0	1	2
.	0.07692	52	0	2	0
.	0.07547	106	0	3	2
.	0.07143	28	0	1	0
225	0.07143	14	0	0	1

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
226	0.06897	29	0	0	2
.	0.06818	44	0	1	1
.	0.06780	59	0	2	0
.	0.06522	92	0	2	2
	0.06522	46	0	1	1
	0.06250	16	0	0	1
	0.06122	49	0	1	1
	0.06098	82	0	1	3
	0.06000	50	0	1	1
	0.05882	34	0	1	0
	0.05714	35	0	1	0
	0.05263	19	0	0	1
	0.05263	19	0	0	1
	0.05128	39	0	0	2
	0.05000	60	0	0	3
	0.04444	45	0	0	2
	0.03704	54	0	0	2
	0.03390	59	0	0	2
	0.03333	30	0	0	1
	0.03333	30	0	0	1
	0.03030	66	0	1	0
.	0.03030	33	0	0	1
.	0.02941	68	0	0	2
.	0.02532	79	0	1	0
250	0.02273	44	0	0	1

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
251	0.02128	47	0	0	1
.	0.01639	122	0	1	0
.	0.01613	62	0	0	1
.	0.01124	89	0	0	1
	0.01099	91	0	0	1
	0.00952	105	0	0	1
	0.00855	117	0	0	1
	0.00000	68	0	0	0
	0.00000	64	0	0	0
	0.00000	58	0	0	0
	0.00000	58	0	0	0
	0.00000	55	0	0	0
	0.00000	49	0	0	0
	0.00000	48	0	0	0
	0.00000	46	0	0	0
	0.00000	43	0	0	0
	0.00000	39	0	0	0
	0.00000	38	0	0	0
	0.00000	34	0	0	0
	0.00000	32	0	0	0
	0.00000	28	0	0	0
.	0.00000	27	0	0	0
.	0.00000	25	0	0	0
.	0.00000	25	0	0	0
275	0.00000	23	0	0	0

Table V. SCORSORT SUMMARY (continued)

k	S_k	N_k	X_{1k}	X_{2k}	X_{3k}
276	0.00000	22	0	0	0
.	0.00000	21	0	0	0
.	0.00000	19	0	0	0
.	0.00000	19	0	0	0
	0.00000	17	0	0	0
	0.00000	16	0	0	0
	0.00000	16	0	0	0
	0.00000	14	0	0	0
	0.00000	14	0	0	0
	0.00000	12	0	0	0
	0.00000	11	0	0	0
.	0.00000	7	0	0	0
.	0.00000	5	0	0	0
.	0.00000	1	0	0	0
290	0.00000	1	0	0	0

of the fraction of i^{th} place votes awarded to teacher K from the population that knew him, i=1,2,3; k=1,2,... Therefore, in order to have $S_k > S_{k'}$, the relationship

$$w_1V_{1k} + w_2V_{2k} + w_3V_{3k} > w_1V_{1k'} + w_2V_{2k'} + w_3V_{3k'} \quad , K \neq K'$$

must hold. Rearranging yields,

$$w_1(V_{1k}-V_{1k'}) + w_2(V_{2k}-V_{2k'}) + w_3(V_{3k}-V_{3k'}) > 0$$

Now, if all values of $V_{ik} - V_{ik'} \geq 0$, with at least one value in which the equality does not hold, then $S_k > S_{k'}$, regardless of the value of $\overline{W}$ and teacher K' can be eliminated. An even stronger condition would be met if all values of $V_{ik} - V_{ik'} > 0$. This condition is called absolute dominance.

For example, suppose three teachers have the following values of $\overline{V}$:

T_k	V_{1k}	V_{2k}	V_{3k}
1	.7825	.5377	.4114
2	.7519	.5211	.4081
3	.7263	.3862	.5622

T_1 absolutely dominates T_2, but neither T_1 nor T_3 is absolutely dominated.

Another form of dominance is called complete dominance. This would occur when the condition $w_1 \geq w_2 \geq w_3$ must be violated in order for a particular instructor to win. In the above example, if all three place votes were given equal weights, the extreme example which still maintains the relationship $w_1 \geq w_2 \geq w_3$, T_1 would still have a higher score than T_3. However, if a weighting vector were allowed in

which a third place vote is worth more than either a first or a second place vote, T_3 would have a higher score than T_1. Since this is the only case in which T_3 can win, we say that T_3 is completely dominated by T_1 and can also be eliminated from the competition.

In order to invoke these conditions of dominance and hence further reduce the number of possible recipients of the award, a FORTRAN program called "Dominance"[5] was run on those faculty members having the top 25 scores from "Scorsort". The results are listed in Table VI. The AD and CD columns list the results of the absolute dominance and complete dominance tests, respectively. A 1 indicates T_k is dominated and a 0 indicates he is not. As can be noted, the absolute dominance test reduced the number of possible recipients to 6 and the complete dominance further reduced this number to 3.

F. PAIRED COMPARISONS

Since all students were not exposed to the same instructors, it was felt that it might be of interest to select combinations of two of the three undominated instructors and compute their scores using only the votes of those voters who indicated knowing them both. In this way the scores could be compared to substantiate or dispute the relative rankings determined using the votes of the entire

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[5] A listing of "Dominance" is included in Appendix B.

Table VI. DOMINANCE TEST RESULTS

T_k	V_{1k}	V_{2k}	V_{3k}	AD	CD
1	.30000	.30000	.13333	0	0
2	.38461	.12820	.07692	0	0
3	.26923	.23076	.11538	1	1
4	.30769	.10256	.20512	0	0
5	.26119	.22388	.11194	1	1
6	.24324	.21621	.18918	0	1
7	.25806	.20430	.13978	0	1
8	.31250	.09375	.04687	1	1
9	.26470	.13725	.08823	1	1
10	.25000	.16176	.09558	1	1
11	.23076	.15384	.12820	1	1
12	.24489	.10204	.14285	1	1
13	.20833	.12500	.22916	0	1
14	.25806	.06451	.09677	1	1
15	.19444	.16666	.11111	1	1
16	.22222	.11111	.09722	1	1
17	.15000	.25000	.10000	1	1
18	.21739	.13043	.04347	1	1
19	.21348	.08988	.08988	1	1
20	.17777	.15555	.08888	1	1
21	.17021	.17021	.08510	1	1
22	.18248	.13138	.10948	1	1
23	.16000	.20000	.04000	1	1
24	.20833	.08333	.04166	1	1
25	.19354	.06451	.12903	1	1

population. A FORTRAN program called "Comparison"[6] was run and the scores were recomputed for T_1 vs. T_2, T_1 vs. T_4, and T_2 vs. T_4. It was determined, however, that T_1 and T_4 had no voters in common and there did not exist a valid basis for comparison.

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[6] A listing of "Comparison" is included in Appendix B.

IV. THE SELECTION

Upon completion of the aforementioned score computations and tests the following information was presented to the committee for their consideration and selection of a winner:

1. Results of the score calculations
2. The number of 1st, 2nd and 3rd place votes received by the top 25 scorers
3. Results of the dominance tests for the top 25 scorers
4. Results of the paired comparisons
5. Extracts of the comments sections of ballots selecting T_1, T_2, or T_4 in first place.

After discussion and deliberation, the committee unanimously decided to recommend to the Provost that the award be divided equally among teachers T_1, T_2, and T_4. The final decision of the Provost, however, was to present the award to Professor M. F. Reynolds of the Department of Physics and Chemistry.

V. FURTHER ANALYSIS

In order to determine if any one academic department was predominant among the top 50 or bottom 50 scorers, the distribution for each department was determined and the percentage involved of each department was calculated. Tables VII and VIII give the results for 1972 and 1973.

Table VII. DISTRIBUTION OF TOP 50 SCORERS - 1972 and 1973

Dept.	1972 Number and % Of Department	1973 Number and % Of Department
Electrical Engr.	5 (11.6%)	6 (15.8%)
Aeronautics	3 (16.7%)	4 (19.1%)
Aviation Safety	1 (25.0%)	1 (20.0%)
Govt. and Humanities	2 (22.2%)	1 (11.1%)
Mathematics	8 (18.2%)	8 (18.6%)
Mechanical Engr.	4 (28.6%)	4 (23.7%)
Meteorology	3 (25.0%)	4 (28.6%)
Oceanography	2 (14.3%)	1 (7.1%)
Ops. Rsch. & Admin. Sci.	11 (14.7%)	14 (17.1%)
Physics & Chem.	6 (13.3%)	3 (8.8%)
NMSC	5 (33.3%)	4 (30.8%)

Table VII. DISTRIBUTION OF BOTTOM 50 SCORERS - 1972 & 1973

Dept.	1972 Number and % Of Department	1973 Number and % Of Department
Electrical Engr.	7 (16.3%)	8 (21.0%)
Aeronautics	2 (11.1%)	4 (19.1%)
Aviation Safety	1 (25.0%)	2 (40.0%)
Govt. and Humanities	0	1 (11.1%)
Mathematics	3 (6.8%)	8 (18.6%)
Mechanical Engr.	2 (14.3%)	1 (5.9%)
Meteorology	4 (33.3%)	3 (21.4%)
Oceanography	5 (35.7%)	3 (21.4%)
Ops. Rsch. & Admin. Sci.	17 (22.7%)	14 (17.1%)
Physics & Chem.	7 (15.6%)	5 (14.7%)
NMSC	2 (13.3%)	2 (9.2%)

It is interesting to note that the top 10 scorers of 1972 represented 9 different departments and the top 10 scorers of 1973 represented 7 different departments. This would appear to indicate that the selection process was successfully selecting the top man in each department but that placement within the top 10 to 20 positions occurred on a random basis. In order to further investigate this possibility, a Spearman Rank-Order Correlation (rho) test was performed using the rankings of the top man in each department in 1972 versus the rankings of the top man in those same departments in 1973.

DEPT.	DEPARTMENT RANK IN 1972	DEPARTMENT RANK IN 1973
Meteorology	1	11
Mech. Engr.	2	3
Physics & Chem.	3	2
Elec. Engr.	4	4
Avn. Safety	5	6
Aeronautics	6	8
Mathematics	7	7
Ops. Rsch. and Admin. Sci.	8	1
Govt. and Humanities	9	9
NMSC	10	5
Oceanography	11	10

The statistic $\text{rho} = 1 - \frac{6\Sigma D^2}{N(N^2-1)}$ was computed where

D = difference in ranking of each dept. in 1972 and 1973

N = number of departments

$$6\Sigma D^2 = 1092 \qquad N(N^2-1) = 1320$$

$$\text{rho} = 1 - .828 = .172$$

Testing the significance of rho, i.e., the hypothesis that rho = 0, the t-statistic with 9 degrees of freedom is calculated to be

$$t = \text{rho}\sqrt{\frac{N-2}{1-\text{rho}^2}} = .169$$

which is not significant at the .05 level of significance and the hypothesis is not rejected. This would appear to indicate that the rankings of the top men in each department in 1972 and 1973 were randomly distributed within the first

twenty scores. Further substantiation of this hypothesis can be seen by noting the small number of voters that the top 20 scorers have in common. Table IX is a matrix depicting the number of voters in common among the top 20 scorers in 1973. It can easily be seen that in most cases where teachers are in different departments, the number of students in common is quite small. In order to facilitate comparison, the following is a list of those teachers among the top 20 who are in the same department:

1, 5, 18

2, 8

3, 11, 14

6, 15

9, 10, 19

12, 17

Table IX. NUMBER OF COMMON VOTERS AMONG TOP 20 SCORERS 1973

0	2	0	0	5	0	0	0	0	1	0	1	1	0	0	1	0	6	2	2
2	0	0	1	2	0	5	7	6	7	6	2	3	4	0	9	1	3	7	3
0	0	0	1	0	0	2	3	1	2	17	2	0	15	0	2	2	0	4	1
0	1	1	0	0	0	0	11	1	5	1	1	0	1	0	0	0	0	0	0
5	2	0	0	0	6	17	2	6	5	2	0	1	1	7	5	2	5	3	1
0	0	0	0	6	0	8	1	1	0	0	1	0	0	32	0	0	0	0	0
0	5	2	0	17	8	0	5	4	6	3	8	12	2	7	18	1	3	3	2
0	7	3	11	2	1	5	0	7	8	5	3	0	6	0	8	2	0	9	3
0	6	1	1	6	1	4	7	0	27	6	5	0	4	0	13	1	1	21	19
1	7	2	5	5	0	6	8	27	0	7	4	2	6	1	9	1	1	26	18
0	6	17	1	2	0	3	5	6	7	0	5	2	22	0	5	4	1	9	3
1	2	2	1	0	1	8	3	5	4	5	0	0	3	0	1	14	0	8	1
1	3	0	0	1	0	12	0	0	2	2	0	0	0	0	3	0	5	0	0
0	4	15	1	1	0	2	6	4	6	22	3	0	0	0	5	2	0	5	3
0	0	0	0	7	32	7	0	0	1	0	0	0	0	0	1	0	0	0	0
1	9	2	0	5	0	18	8	13	9	5	1	3	5	1	0	1	1	16	20
0	1	2	0	2	0	1	2	1	1	4	14	0	2	0	1	0	0	2	1
6	3	0	0	5	0	3	0	1	1	1	0	5	0	0	1	0	0	3	0
2	7	4	0	3	0	3	9	21	26	9	8	0	5	0	16	2	3	0	19
2	3	1	0	1	0	2	3	19	18	3	1	0	3	0	20	1	0	19	0

VI. RECOMMENDATIONS

It is felt that the present system can be used effectively to select within each department that faculty member considered most proficient; however, as a means of further definitive selection, the present system is considered inadequate. The following two proposals are presented for consideration:

A. CONTINUATION OF PRESENT SELECTION METHOD

The present method can be continued as a means of selecting the top scorer in each department. The cash award which is normally presented to the winner can be used to purchase appropriate engraved plaques or other memorabilia which could be presented to the 11 co-winners at the June graduation ceremonies.

Should the present selection method be continued, the following modifications are recommended:

1. Faculty members should not be permitted to vote. During the course of ballot verification numerous faculty members who were identified by their signatures on the outside envelope were found to have voted for themselves. No accurate figures were kept in this regard, but it is estimated that 25% - 35% of faculty member ballots fell into this category.

The average number of eligible faculty identified in Part C of the ballot by faculty members was 25.8. These

figures include three faculty members who identified 119, 115, and 114 persons in Part C. Excluding these three figures from the calculations reduces the average number to 22.5. Considering the fact that in most departments faculty members rarely have the opportunity to witness each other at work in the classroom, the figure of 22.5 appears to be quite high. This would indicate that personal rather than professional familiarity is being used as a criterion for filling out Part C.

2. A cover letter from the Superintendent should be included with all distributed ballots. During the course of the year, numerous questionnaires of various types are distributed to students in their SMC boxes by other officer students attempting to use the responses for course requirement studies or theses. Because of the large number involved, many of the questionnaires find their way to the SMC trash containers. Considering the fact that student response was less than 50%, it is felt that a large number of the unreturned ballots suffered a similar fate. A cover letter from the Superintendent, identical to that accompanying each alumnus ballot, will impress on each student that the ballot is of a semi-official nature and a matter in which the Superintendent has an interest and should increase student participation.

3. The headings of Parts B and C of the ballot should be revised. Of the 335 disqualified ballots, 275 failed to

identify 5 faculty members in Part C. The instruction sheet accompanying each ballot explains the procedure to be followed, but no instructions for circling the identification numbers of at least 5 faculty members appears on the ballot itself. Furthermore, Part B should follow Part C in order to be in a logical sequence since Part C is performed prior to Part B.

A suggested format for the headings of Parts B and C is as follows:

PART B - LIST OF ELIGIBLE FACULTY (ALL FACULTY WHO HAVE TAUGHT TWO OR MORE COURSE SEGMENTS IN CALENDAR YEAR 1973 EXCEPT CURRICULAR AND LIAISON OFFICERS, MEMBERS OF THE SELECTION COMMITTEE AND PRIOR WINNERS)
ENCIRCLE THE FOUR-DIGIT IDENTIFICATION NUMBER OF ALL THOSE WITH WHOSE TEACHING ABILITY YOU ARE SUFFICIENTLY ACQUAINTED TO MAKE A JUDGMENT. DO NOT CONTINUE TO PART C UNLESS YOU HAVE ENCIRCLED AT LEAST FIVE NUMBERS.

PART C - NOMINATIONS (INSERT A FOUR-DIGIT FACULTY IDENTIFICATION NUMBER IN EACH BLANK). WRITE-IN VOTES ARE NOT ACCEPTABLE.

4. The following four-digit identification numbers should be changed in order that the fourth digit conform to the method discussed in Part II, D of this paper:

2552	to	2556
5244	to	5249
5200	to	5205
5211	to	5216
5222	to	5227

5. A number of instructors who should have been included were inadvertently omitted from the ballot and conversely, the ballot contained the names of some ineligible

faculty members. A thorough check must be made to insure that all eligible faculty members are included.

6. The designator for Professor under Faculty Rank should be PR in lieu of RP and the designator EE for Electrical Engineering should be included under Faculty Department.

B. ADOPTION OF A NEW SELECTION SYSTEM

In order to attempt to select the one best teacher in the school, it is recommended that the present system be replaced by one employing a new methodology. What is required is a system whereby faculty members can be judged by different populations on the basis of various teacher qualities or characteristics. If the scales for judgment were identical, all faculty members could then be compared on the basis of their total scores divided by the total number of evaluations. A problem inherent in this technique, however, is the selection of those descriptions of a teacher's classroom behavior which are highly correlated to the student's overall concept of effective teaching. Examination of the various forms used by schools throughout the nation to evaluate teacher performance indicates a lack of agreement on what characteristics are important.[7] Consequently, work was done at the University of Washington by Grace M. French in an attempt to select those teacher

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[7] French, G.M., College Students' Concept of Effective Teaching Determined by an Analysis of Teacher Ratings, Ph.D. Thesis, University of Washington, 1957, p. 2.

characteristics best suited to reflect what students consider important for teacher effectiveness. A student questionnaire was devised which consisted of 41 items gathered from forms in use throughout the country and each student was asked to judge his instructor on a five point scale on each of the items listed as well as to provide an overall judgment of the teacher. The 41 items were regarded as independent variables and the overall judgment as the dependent variable. It was then determined what relationship exists between the system of independent variables and the dependent variable; i.e., the relative contribution of each item to the overall judgment. This was measured as the product of $B_i r_{ic}$ where

B_i = regression weight for the i^{th} item

r_{ic} = validity coefficient for the i^{th} item [8]

The top 25 items in the order of highest contribution are listed in Appendix C.

It is recommended that a student opinion questionnaire be devised for use at the Naval Postgraduate School using the 25 items listed in Appendix C. Since each item varies in its contribution to overall judgment, a system of weights should be devised for each of the items in proportion to its relative value. A specified portion of class time at the end of each quarter could be allotted for completion of the

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[8] Validity is defined in French, p. 25, as the correlation between a predictor and that which is being predicted. No further explanation of r_{ic} could be found.

questionnaire by all students and a score compiled for each faculty member which would be updated each quarter. In addition to selection of the annual excellence in teaching award recipient, a form such as that proposed could be used in conjunction with classroom visitation appraisals by heads of departments as well as publication accomplishments to assist in making decisions regarding promotions or tenure.

APPENDIX A

BALLOT

PART A - STATISTICAL (ENCIRCLE APPROPRIATE CODE IN EACH SECTION)

VOTER CATEGORY

S STUDENT A ALUMNUS F FACULTY C CURRICULAR OFFICER

STUDENT/ALUMNUS/CURRICULAR OFFICER

Branch of Service		Military Rank	Curricular Area	
N	Navy	01	30	Ops Analysis
M	Marine Corps	02	31	Aero Eng
A	Army	03	32	Elec & Comm Eng
C	Coast Guard	04	33	Phys Sci & Sys Tech (Formerly Ordnance)
L	Air Force	05	34	Naval Eng & Eng Sci
F	Foreign	06	35	Env Sci
X	Civilian	07	36	Mgmt & Compt Sci
			38	Baccalaureate
			39	Def Management

FACULTY

Rank		Department	
IR	Instructor	AE	Aeronautics
AT	Assistant Prof.	AO	Aviation Safety
AC	Associate Prof.	MN	Bus Ad & Econ
RP	Professor	GH	Govt & Humanities
		MA	Math
		ME	Mech Eng
		MR	Meteorology
		OC	Oceanography
		OA	Ops Analysis
		PH	Physics & Chem
		NS	Navy Mgmt Sys

PART B - NOMINATIONS (INSERT A FOUR DIGIT FACULTY IDENTIFICATION NUMBER IN EACH BLANK)

FIRST CHOICE_____ SECOND CHOICE_____ THIRD CHOICE_____

PART C - LIST OF ELIGIBLE FACULTY (ALL FACULTY WHO HAVE TAUGHT TWO OR MORE COURSE SEGMENTS IN CALENDAR YEAR 1972, EXCEPT CURRICULAR AND LIAISON OFFICERS AND MEMBERS OF THE SELECTION COMMITTEE)

AVIATION SAFETY PROGRAMS

1014 Bomberger, R. B.
1025 Bradbury, C. M.
5016 Branson, J. J.
5544 Nielsen, J. C.
1047 Wible, L. C.

DEPARTMENT OF AERONAUTICS

1058 Ball, R. E.
5027 Bank, M. H.
5450 Bell, R. W.
1069 Bennett, J.A.J.
1070 Biblarz, O.
1081 Collins, D. J.
5472 Evans, R. M.
5038 Fuhs, A. E.
1092 Gawain, T. H.
5049 Hess, R. A.
1119 Kahr, C. H.
1120 Layton, D. M.
1131 Lindsey, G. H.
1142 Miller, J. A.
1153 Netzer, D. W.
5050 Power, H. L.
1175 Redlin, M. H.
1186 Schmidt, L. V.
5461 Shreeve, R. P.
1197 Vavra, M. H.
1203 Zucker, R. D.

DEPARTMENT OF ELEC. ENGR.

1481 Adler, R. W.
5061 Bach, R.
1519 Baycura, O. M.
1531 Bouldry, J. M.
1542 Breida, S.
1564 Chan, S.
1586 Cooper, P. E.
1597 Cotton, M. L.
1625 Ewing G. D.
1647 Geist, J. M.
1658 Gerba, A., Jr.
1669 Houston, R. K.
1670 Kirk, D. E.
1681 Klamm, C. F.,Jr.
4035 Knorr, J. B.
1692 Marmont, G. H.
1708 Miller, R. L.
5083 Myers, H. L.
5449 Ohlson, J.
1753 Panholzer, R.
4079 Powers, J. P.
4080 Powers, V. M.
5094 Price, T. G.
1764 Rahe, G. A.
1775 Rothauge, C. H.
1786 Sackman, G. L.
1797 Sheingold, A.
1803 Smith, W. C.
1814 Spaugy, D. A.
1825 Stentz, D. A.
1836 Strum, R. D.
1847 Terman, F. W.
1858 Thaler, G. J.
1869 Titus, H. A.
1870 Turner, J. B., Jr.
5438 Wang, C. C.
1881 Ward, J. R.
1892 Wilcox, M. L.

DEPARTMENT OF GOVT & HUMANITIES

1919 Amos, J. W., II
1931 Boggess, W. C.
1920 Bjarnason, L. L.
5100 Caldwell, D. E.
1942 Gabel, B. B.
1953 Gottschalk, S.
5250 Huff, B. R.
5261 Ross, G. A.
1997 Smith, B.M.L.

DEPARTMENT OF MATHEMATICS

5500 Bamford, R. C.
2134 Bender, A. P.
2145 Bleick, W. E.
2156 Bolles, R. C.
5144 Brubaker, R. H.
2167 Budway, J. J.
2189 Chewning, W. C.
2190 Comstock, C.
2206 Davis, D. L.
2217 Dixon, D. R.
2228 Estell, R. J.
2239 Faulkner, F. D.
2240 Franke, R.
2251 Giarratana , J.
2262 Gibbons, G. D
4091 Hanna, R. M.
2295 Jayachandran, T.
2301 Jennings, W.
2312 Kildall, G. A.
2323 Kodres, U. R.
2334 Kolitz, B. L.
5166 Kovach, L. D.
5511 Logan, T. J.
2367 Lucas, K. R.
2378 Marks, H. B.
2389 Morris, G. W.
5522 Moore, L. R.
2390 Pierce, J. P.
2417 Pulliam, F. M.
5177 Rice, B.
2428 Roberts, A. B.

DEPARTMENT OF MATHEMATICS

5533 Russak, I. B.
2439 Schoenstadt, A. L.
2451 Shorb, A. M.
2462 Singer, E. A.
5188 Singer, S.
2484 Stewart, E. J.
2495 Stoops, G. A.
2501 Syms, G. H.
2512 Trahan, D. H.
2523 Wang, P. C. C.
2534 Weir, M. D.
2545 Wilde, C. O.

DEPARTMENT OF MECHANICAL ENGR.

2552 Brock, J. E.
2567 Cantin, G.
2578 Cooper, T. E.
5566 Edwards, G. R.
2589 Garrison, G. J.
2590 Houlihan, T. M.
2606 Kelleher, M. D.
2617 Marto, P. J.
5577 McKinnon, E. A.
2628 Newton, R. E.
2639 Nguyen, D. H.
5555 Nunn, R. H.
5588 Perkins, A. J.
2640 Prowell, R. W.
5199 Pucci, P. F.
2651 Salinas, D.
5200 Sarpkaya, T.

DEPARTMENT OF METEOROLOGY

2673 Alberty, R. L.
2684 Davidson, K. L.
2712 Elsberry, R. L.
4107 Haltiner, G. J.
2723 Hamilton, H. D.
5211 Haney, R. L.
2745 Martin, F. L.
2756 Oakes, W. B.
4118 Renard, R. J.
2767 Schardt, D. L.
2778 Taylor, C. L.
5494 Tracton, M. S.
2789 Van der Bijl, W.
7001 Williams, R. T.

DEPARTMENT OF OCEANOGRAPHY

2806 Andrews, R. S.
5272 Bechelmayr, L. R.
2828 Boston, N. E. J.
5222 Bourke, R. H.
2840 Denner, W. W.
2851 Galt, J. A.
2895 Jung, G. H.
4130 Paquette, R. G.
5244 Roberts, C. K.
2912 Thompson, W. C.
2923 Thornton, E. B.
2934 Traganza, E. D.
2956 von Schwind, J. J.
2967 Wickham, J. B.

DEPARTMENT OF OPS RES & ADM SC

5311 Abbey, D. L.
2978 Andrus, A. F.
2989 Arima, J. K.
0066 Barden, R. S.
2990 Barr, D. R.
0105 Bedow, R. J.
3010 Brill, E. A.
3021 Butterworth, R. W.
3032 Burnett, T. D.
5355 Burns, D. C.
3043 Capra, J. R.
1214 Carrick, P. M.
1225 Church, W. H.
5283 Corcoran, A. W.
0077 Courtney, D.
4013 Creighton, J. W.
3054 Cunningham, W. P.
1247 Darbyshire, L.
5333 DeMayo, P.
1258 Eisenhardt, P.
1269 Elster, R. S.
3076 Esary, J. D.
3098 Floyd, J. A.
5399 Folsom, R. N.
3115 Forrest, R. N.
3104 Free, W. D.
1270 Fremgen, J. J.
3126 Gaver, D. P.
1292 Githens, W. H.
1308 Grainger, T. L.
3148 Greenberg, H.
5294 Haga, W. J.
5300 Hampton, D. R.
4091 Hanna, M.
3160 Heidorn, G. E.
3171 Higgins, J. E.
0088 Horton, F. C.
1319 Hoverland, H. A.
3182 Howard, G. T.
1320 Hynes, J. P.
1331 Jolly, J. A.
0099 King, G. J.
3948 Kline, M. B.
1353 Lande, R. S.
1364 Lane, H. L.
1375 Lee, M. H.
4141 Lewis, P. A. W.
3243 Lindsay, G. F.
3265 Marshall, K. T.
1386 McDonald, J. H.
3254 McMasters, A. W.
3276 Milch, P. R.
5405 Neil, D. E.
5427 Overbay, W. A.
3287 Peterson, C. A.
3298 Poock, G. K.
3304 Preston, F. L.
0116 Rsike, W. M.
3315 Richards, F. R.
4046 Schneidewind, N. F.
3326 Schrady, D. A.
5366 Schumann, J. F.
0127 Senger, J. D.
3348 Shubert, B. O.
3359 Shudde , R. H.
5416 Smith, J. H.
3360 Sovereign, M. G.
1425 Steckler, M. J.
5322 Stephan, R. A.
5377 Tate, T.
3382 Taylor, J. G.
5388 Terasawa, K.
0149 Thomas, M. D.
3409 Tysver, J. B.
3410 Washburn, A. R.
1458 Wegener, W. H.
0161 Weitzman, R. A.
0172 Whipple, D.
1470 Womer, N. K.
5344 Zabrycki, E. A.
3432 Zehna, P. W.
3443 Zweig, H. J.

DEPARTMENT OF PHYSICS & CHEM

3454 Armstead, R. L.
3465 Buskirk, F. R.
3476 Ceglio, N. M.
3487 Cooper, A. W.
3498 Cooper, J. N.
3504 Coppens, A. B.
3515 Crittenden, E. C., Jr.
3526 Dahl, H. A.
0183 Dally, E. B.
3537 Eller, A. I.
3548 Garrettson, G. A.
3559 Handler, H. E.
5483 Heinz, O.
3571 Kalmbach, S. H.
3582 Kelly, R. L.
0194 Maruyama, X. K.
3621 Medwin, H.
3632 Milne, E. A.
3643 Neighbours, J. R.
3654 Olsen, L. O.
3665 Reese, W.
2073 Reinhardt, R. A.
2084 Reynolds, M. F.
3687 Rodeback, G. W.
2095 Rowell, C. F.
3704 Schscher, G. E.
5122 Schultz, J. W.
3715 Schwirzke, F. R.
2101 Sinclair, J. E.
2112 Tolles, W. M.
3726 Williamson, T. J.
7012 Wilson, O. B., Jr.
3737 Woehler, K. E.
3748 Zeleny, W. B.

NAVY MANAGEMENT SYSTEMS CENTER

3759 Blandin, S. W.
3760 Boynton, R. E.
0200 Callahan, J. F.
0211 Campbell, W. A.
3782 Childs, F. E.
3793 Dawson, J. E.
3810 Doran, E. J.
5599 Ecker, H. P.
3821 Freed, E. J.
3854 Mauer, W. A.
3898 Ulrey, I. W.
3887 von Pagenhardt, R.
3904 Wood, C. L.

PART D - SUPPORTING REMARKS FOR YOUR PRIMARY NOMINATION (OPTIONAL)

AWARD FOR EXCELLENCE IN TEACHING

In order to augment the existing incentives for teaching of high quality, an Award for Excellence in Teaching has been established by the Superintendent. A substantial stipend was made possible through a gift to the Naval Postgraduate School Foundation in honor of Rear Admiral John J. Shieffelin, USN. The judgments of those who have participated in the educational processes at the Naval Postgraduate School are of primary importance in determining the recipients. This poll is being conducted to assess the collective opinion of students, faculty, staff, and selected alumni. After accumulating and processing the voting results, the Selection Committee will make its recommendations to the Superintendent.

A meaningful selection of the Award recipients is heavily dependent upon input from a large portion of the eligible voters. Your response is therefore earnestly requested. Please complete the enclosed ballot in accordance with the instructions below. The results of the polling, other than the name of the Award recipients, will be treated as privileged information.

BALLOTING PROCEDURE:

Step 1. Complete the information requested at the top (Part A) of the ballot. These items are for purposes of statistical analyses only.

Step 2. On the list of eligible faculty (Part C), encircle the four-digit identification number at the left of all those with whom you are sufficiently acquainted to make a judgment. If you have circled five or more numbers on the ballot, proceed to Step 3. Otherwise, please return your ballot as directed in Step 5.

Step 3. From the subset of faculty you have indicated in Step 2, select from one (1) to three (3) nominees. Indicate your preferences in order by placing the four-digit identification numbers of your nominees for first, second and third choices in the appropriate spaces provided in Part B.

Step 4. You are invited to furnish a short statement in support of your primary nomination. Indicate those qualities which, in your judgment, make him an outstanding teacher. Space is provided for this at the end (Part D) of the ballot.

Step 5. Place your completed ballot in the enclosed return envelope, sign the envelope and return. To be counted ballots must be received by 15 April 1973. Ballots will be separated from the envelopes.

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA - 93940 IN REPLY REFER TO:

Dear Alumnus:

This June awards for excellence in teaching for the third time will be given to members of our faculty, civilian or military. These will include the Rear Admiral John J. Shieffelin Award, made possible through a grant to the Naval Postgraduate School Foundation. Previous winners of the award are Professor John N. Dyer of the Department of Physics, Professor Eugene C. Haderlie of the Department of Oceanography and Assistant Professor Ronnie L. Alberty of the Department of Meteorology. The recipients are determined each year through a careful poll taken among alumni, students and faculty.

In recognition of the fact that some of the qualities inherent in teaching excellence may not be manifest to the student until certain experiences have been afforded in the field, we again seek an input to the poll from graduates.

Your year group has been selected as one which should have had time to evaluate the quality of your instruction here without being too far removed to recall the experience clearly.

Would you be kind enough to read the accompanying material and make your selections? It would be greatly appreciated.

Sincerely,

Mason Freeman

MASON FREEMAN
Rear Admiral, U. S. Navy
Superintendent

Encls.

APPENDIX B

PROGRAM 1 TRANSFER

```
//   EXEC  COBFCLG
//COB.SYSIN DD *
       IDENTIFICATION DIVISION.
       PROGRAM-ID. 'TRANSFER'.
       AUTHOR. K.M.EISENHARDT.
       DATE-WRITTEN..APRIL,1970.
       INSTALLATION. NPS-MONTEREY.
       REMARKS.  TRANSFER PLACES THE CARD IMAGES OF EACH
                 BALLOT ON A TAPE AND CHECKS FOR KEYPUNCH ERRORS.
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-360-67.
       OBJECT-COMPUTER. IBM-360-67.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT CARD-FILE ASSIGN TO 'CARD' UTILITY.
           SELECT BALLOT-FILE ASSIGN TO 'BALLOT' UTILITY.
       DATA DIVISION.
       FILE SECTION.
       FD  CARD-FILE
           LABEL RECORD IS OMITTED
           RECORDING MODE IS F
           RECORD CONTAINS 80 CHARACTERS
           DATA RECORDS ARE BALLOT, BALLOT-CONT.
       01  BALLOT.
           02  STATISTICS.
               03  NUMBER                          PICTURE XXXX.
               03  VOTER                           PICTURE X.
               03  FILLER                          PICTURE X.
               03  MIL-RANK                        PICTURE XX.
               03  SERVICE                         PICTURE X.
               03  CURRICULUM                      PICTURE XX.
               03  ACAD-RANK                       PICTURE XX.
               03  DEPT                            PICTURE XX.
               03  COMMENT                         PICTURE X.
           02  INITIAL.
               03  A                               PICTURE 9.
               03  B                               PICTURE 9.
               03  C                               PICTURE 9.
               03  D                               PICTURE 9.
```

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     02  SECOND.
         03  A                                    PICTURE 9.
         03  B.                                   PICTURE 9.
         03  C                                    PICTURE 9.
         03  D                                    PICTURE 9.
     02  THIRD.
         03  A                                    PICTURE 9.
         03  B                                    PICTURE 9.
         03  C                                    PICTURE 9.
         03  D                                    PICTURE 9.
     02  PROF       OCCURS 12 TIMES.
         03  ELEMENT OCCURS 4 TIMES               PICTURE 9.
     02  FILLER                                   PICTURE XXXX.
01   BALLOT-CONT.
     02  NUMBER                                   PICTURE XXXX.
     02  CONTINUE                                 PICTURE X.
     02  FILLER                                   PICTURE X.
     02  POP      OCCURS 17 TIMES.
         03  EL OCCURS 4 TIMES                    PICTURE 9.
     02  FILLER                                   PICTURE XXXXXX.
FD   BALLOT-FILE
     LABEL RECORD IS OMITTED
     RECORDING MODE IS F
     BLOCK CONTAINS 3 RECORDS
     RECORD CONTAINS 477 CHARACTERS
     DATA RECORD IS BALLOT-RECORD.
01   BALLOT-RECORD.
     02  NUMBER                                   PICTURE XXXX.
     02  STATISTICS.
         03  VOTER                                PICTURE X.
         03  MIL-RANK                             PICTURE XX.
         03  SERVICE                              PICTURE X.
         03  CURRICULUM                           PICTURE XX.
         03  ACAD-RANK                            PICTURE XX.
         03  DEPT                                 PICTURE XX.
         03  COMMENT                              PICTURE X.
     02  ONE                                      PICTURE XXX.
     02  TWO                                      PICTURE XXX.
     02  THREE                                    PICTURE XXX.
     02  M                                        PICTURE 999.
     02  POPULATION  OCCURS 150 TIMES             PICTURE XXX.
WORKING-STORAGE SECTION.
77   I                                            PICTURE 999.
77   CHECK                                        PICTURE XXXX.
77   TEST                                         PICTURE 9.
77   ALPHA                                        PICTURE X.
77   CNTR          PICTURE 9999                   VALUE 0.
PROCEDURE DIVISION.
```

```
PREPARATION-SECTION.
    OPEN INPUT CARD-FILE,
         OUTPUT BALLOT-FILE.
INITIAL-CARD-SECTION.
    READ CARD-FILE RECORD AT END GO TO COMPLETION-SECTION.
    DISPLAY BALLOT.
ENTRY-1.
    MOVE NUMBER IN BALLOT TO CHECK.
    MOVE SPACES TO BALLOT-RECORD.
    MOVE 0 TO M.
STATISTICS-VERIFICATION.
M1.
    IF MIL-RANK IN BALLOT IS GREATER THAN '00' AND LESS
    THAN '08' THEN GO TO M2.
    IF MIL-RANK IN BALLOT IS EQUAL TO SPACES THEN GO TO M2.
    DISPLAY 'MIL-RANK       INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
M2.
    IF SERVICE IN BALLOT IS EQUAL TO 'N' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO 'M' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO 'C' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO 'A' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO 'F' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO 'L' THEN GO TO M3.
    IF SERVICE IN BALLOT IS EQUAL TO SPACES THEN GO TO M3.
    DISPLAY 'SERVICE        INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
M3.
    IF CURRICULUM IN BALLOT IS GREATER THAN '29' AND LESS THAN
    '40' THEN GO TO M4.
    IF CURRICULUM IN BALLOT IS EQUAL TO SPACES THEN GO TO M4.
    DISPLAY 'CURRICULUM     INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
M4.
    IF VOTER IN BALLOT IS EQUAL TO 'S' THEN GO TO BRANCH-JOINT.
    IF VOTER IN BALLOT IS EQUAL TO 'F' THEN GO TO FACULTY.
    IF VOTER IN BALLOT IS EQUAL TO 'A' THEN GO TO BRANCH-JOINT.
    IF VOTER IN BALLOT IS EQUAL TO 'C' THEN GO TO BRANCH-JOINT.
    IF VOTER IN BALLOT IS EQUAL TO SPACES
    THEN GO TO BRANCH-JOINT.
    DISPLAY 'VOTER          INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
FACULTY.
    IF ACAD-RANK IN BALLOT IS EQUAL TO 'AT' THEN GO TO F4.
    IF ACAD-RANK IN BALLOT IS EQUAL TO 'AC' THEN GO TO F4.
    IF ACAD-RANK IN BALLOT IS EQUAL TO 'IR' THEN GO TO F4.
    IF ACAD-RANK IN BALLOT IS EQUAL TO 'PR' THEN GO TO F4.
    IF ACAD-RANK IN BALLOT IS EQUAL TO SPACES THEN GO TO F4.
```

```
    DISPLAY 'ACAD-RANK      INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
F4.
    IF DEPT IN BALLOT IS EQUAL TO 'MN' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'EE' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'MA' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'OA' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'PH' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'AE' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'MR' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'ME' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'OC' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'NS' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'MC' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'GH' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO 'AO' THEN GO TO BRANCH-JOINT.
    IF DEPT IN BALLOT IS EQUAL TO SPACES THEN GO TO BRANCH-JOINT.
    DISPLAY 'DEPT           INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
BRANCH-JOINT.
    IF COMMENT IN BALLOT IS EQUAL TO '0' OR '1' THEN GO TO
    DIGIT-CHECK-1.
    DISPLAY 'COMMENT        INCORRECT - BALLOT' CHECK.
    GO TO FIND-NEXT-BALLOT-1.
DIGIT-CHECK-1.
    MOVE INITIAL TO ONE.
    IF ONE IS EQUAL TO SPACES THEN GO TO C1.
    MULTIPLY 3.0 BY A IN INITIAL.
    MULTIPLY 5.0 BY B IN INITIAL.
    ADD A IN INITIAL, B IN INITIAL, C IN INITIAL GIVING TEST.
    IF TEST IS NOT EQUAL TO D IN INITIAL
    THEN DISPLAY 'INITIAL          INCORRECT - BALLOT' CHECK,
    GO TO FIND-NEXT-BALLOT-1.
C1.
    MOVE SECOND TO TWO.
    IF TWO IS EQUAL TO SPACES THEN GO TO C2.
    MULTIPLY 3.0 BY A IN SECOND.
    MULTIPLY 5.0 BY B IN SECOND.
    ADD A IN SECOND, B IN SECOND, C IN SECOND GIVING TEST.
    IF TEST IS NOT EQUAL TO D IN SECOND
    THEN DISPLAY 'SECOND           INCORRECT - BALLOT' CHECK,
    GO TO FIND-NEXT-BALLOT-1.
C2.
    MOVE THIRD TO THREE.
    IF THREE IS EQUAL TO SPACES THEN GO TO MOVE-1.
    MULTIPLY 3.0 BY A IN THIRD.
    MULTIPLY 5.0 BY B IN THIRD.
    ADD A IN THIRD, B IN THIRD, C IN THIRD GIVING TEST.
```

```
    IF TEST IS NOT EQUAL TO D IN THIRD
    THEN DISPLAY 'THIRD          INCORRECT - BALLOT' CHECK,
    GO TO FIND-NEXT-BALLOT-1.
MOVE-1.
    MOVE CORRESPONDING STATISTICS IN BALLOT TO STATISTICS
    IN BALLOT-RECORD.
    MOVE NUMBER IN BALLOT TO NUMBER IN BALLOT-RECORD.
    MOVE 0 TO I.
LOOP-1.
    ADD 1 TO I.
    MOVE ELEMENT (I, 1) TO ALPHA.
    IF ALPHA IS EQUAL TO SPACES THEN GO TC WRITE-TAPE.
    ADD 1 TO M.
    MOVE PROF (I) TO POPULATION (M).
    MULTIPLY 3.0 BY ELEMENT (I, 1).
    MULTIPLY 5.0 BY ELEMENT (I, 2).
    ADD ELEMENT (I, 1), ELEMENT (I, 2), ELEMENT (I, 3)
    GIVING TEST.
    IF TEST IS EQUAL TO ELEMENT (I, 4) THEN GO TO DUMMY-1.
    DISPLAY 'DIGIT ERROR        ' M '       BALLOT'
    NUMBER IN BALLOT.
FIND-NEXT-BALLOT-1.
    READ CARD-FILE RECORD AT ENC GO TO CCMPLETION-SECTION.
    DISPLAY BALLOT.
    IF NUMBER IN BALLOT IS EQUAL TO CHECK THEN
    GO TO FIND-NEXT-BALLOT-1.
    GO TO ENTRY-1.
DUMMY-1.
    IF I IS NOT EQUAL TO 12 GO TC LOOP-1.
CONTINUATION-CARD-SECTION.
    READ CARD-FILE AT END GO TO COMPLETICN-SECTION.
    DISPLAY BALLOT.
    IF NUMBER IN BALLOT IS NOT EQUAL TO CHECK GO TO ROUTE.
    MOVE 0 TO I.
LOOP-2.
    ADD 1 TO I.
    MOVE EL (I, 1) TO ALPHA.
    IF ALPHA IS EQUAL TO SPACES GO TO WRITE-TAPE.
    ADD 1 TO M.
    MOVE POP (I) TO POPULATION (M).
    MULTIPLY 3.0 BY EL (I, 1).
    MULTIPLY 5.0 BY EL (I, 2).
    ADD EL (I, 1), EL (I, 2), EL (I, 3) GIVING TEST.
    IF TEST IS EQUAL TO EL (I, 4) THEN GO TO DUMMY-2.
    DISPLAY 'DIGIT ERROR        ' M '       BALLOT'
    NUMBER IN BALLOT.
FIND-NEXT-BALLOT-2.
    READ CARD-FILE AT END GO TO COMPLETICN-SECTION.
```

```
    DISPLAY BALLOT.
    IF NUMBER IN BALLOT IS EQUAL TO CHECK THEN
    GO TO FIND-NEXT-BALLOT-2.
    GO TO ENTRY-1.
DUMMY-2.
    IF I IS EQUAL TO 17 GO TO CONTINUATION-CARD-SECTION.
    GO TO LOOP-2.
ROUTE.
    IF VOTER IN BALLOT IS NOT EQUAL TO 'X' THEN ADD 1 TO CNTR,
    WRITE BALLOT-RECORD, GO TO ENTRY-1.
ROUTE-2.
    IF VOTER IN BALLOT IS NOT EQUAL TO 'X' THEN GO TO ENTRY-1.
    DISPLAY 'SEQUENCE ERROR    ' NUMBER IN BALLOT
    '     BALLOT' CHECK.
    READ CARD-FILE RECORD AT END GO TO COMPLETION-SECTION.
    DISPLAY BALLOT.
    GO TO ROUTE-2.
WRITE-TAPE.
    ADD 1 TO CNTR.
    WRITE BALLOT-RECORD.
    GO TO INITIAL-CARD-SECTION.
COMPLETION-SECTION.
    DISPLAY 'NUMBER OF BALLOTS ADDED TO TAPE   ' CNTR.
    CLOSE CARD-FILE, BALLOT-FILE.
    STOP RUN.
```

PROGRAM 2 PROFSORT

```
//     EXEC   COBFCLG,REGION.GO=110K
//COB.SYSIN    DD  *
       IDENTIFICATION DIVISION.
       PROGRAM-ID. 'PROFSORT'.
       AUTHOR. K.M.EISENHARDT.
       INSTALLATION. NPGS-MONTEREY.
       DATE-WRITTEN. APRIL, 1970.
       REMARKS. PROFSORT BUILDS PROF-FILE WHICH IS ORGANIZED BY
                ASCENDING PROF-NUMBER FROM BALLOT-FILE WHICH IS
                RANDOMLY ORGANIZED BY BALLOT.
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-360-67.
       OBJECT-COMPUTER. IBM-360-67.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT BALLOT-FILE ASSIGN TO 'BALLOT' UTILITY.
           SELECT PROF-FILE ASSIGN TO 'SORTOUT' UTILITY.
           SELECT GRAPH-FILE ASSIGN TO 'GRAPH' UTILITY.
       DATA DIVISION.
       FILE SECTION.
       FD  BALLOT-FILE
           LABEL RECORDS ARE OMITTED
           RECORDING MODE IS F
           BLOCK CONTAINS 3 RECORDS
           RECORD CONTAINS 477 CHARACTERS
           DATA RECORD IS BALLOT-RECORD.
       01  BALLOT-RECORD.
           02  NUMBER                              PICTURE XXXX.
           02  STATISTICS.
               03  VOTER                           PICTURE X.
               03  MIL-RANK                        PICTURE XX.
               03  SERVICE                         PICTURE X.
               03  CURRICULUM                      PICTURE XX.
               03  ACAD-RANK                       PICTURE XX.
               03  DEPT                            PICTURE XX.
               03  COMMENT                         PICTURE 9.
           02  ONE                                 PICTURE XXX.
           02  TWO                                 PICTURE XXX.
           02  THREE                               PICTURE XXX.
           02  M                                   PICTURE 999.
           02  POPULATION  OCCURS 150 TIMES        PICTURE XXX.
       FD  PROF-FILE
           LABEL RECORDS ARE OMITTED
           RECORDING MODE IS F
```

```
     BLOCK CONTAINS 50 RECORDS
     RECORD CONTAINS 22 CHARACTERS
     DATA RECORD IS PROF-RECORD.
01   PROF-RECORD.
     02  BALLOT-NUMBER                    PICTURE XXXX.
     02  PROF.
         03  NUMBER                       PICTURE XXX.
         03  VOTE                         PICTURE 9.
         03  COMMENT                      PICTURE 9.
     02  VOTER.
         03  CATEGORY                     PICTURE X.
         03  MILITARY.
             04  RANK                     PICTURE XX.
             04  SERVICE                  PICTURE X.
             04  CURRICULUM               PICTURE XX.
         03  CIVILIAN.
             04  RANK                     PICTURE XX.
             04  DEPT                     PICTURE XX.
     02  M-TOTAL                          PICTURE 999.
FD   GRAPH-FILE
     LABEL RECORDS ARE OMITTED
     RECORDING MODE IS F
     BLOCK CONTAINS 25 RECORDS
     RECORD CONTAINS 133 CHARACTERS
     DATA RECORD IS GRAPH-RECORD.
01   GRAPH-RECORD.
     02  GRAPH      OCCURS 133 TIMES      PICTURE X.
SD   SORT-FILE
     RECORDING MODE IS F
     RECORD CONTAINS 22 CHARACTERS
     DATA RECORD IS SORT-RECORD.
01   SORT-RECORD.
     02  BALLOT-SORT                      PICTURE XXXX.
     02  PROF-SORT                        PICTURE XXX.
     02  VOTE-SORT                        PICTURE 9.
     02  COMMENT-SORT                     PICTURE 9.
     02  STATISTICS-SORT.
         03  VOTER                        PICTURE X.
         03  MIL-RANK                     PICTURE XX.
         03  SERVICE                      PICTURE X.
         03  CURRICULUM                   PICTURE XX.
         03  ACAD-RANK                    PICTURE XX.
         03  DEPT                         PICTURE XX.
     02  M-SORT                           PICTURE 999.
WORKING-STORAGE SECTION.
77   CNTR    PICTURE 9999    COMPUTATIONAL-3     VALUE 0000.
77   INDEX   PICTURE 999999  COMPUTATIONAL-3     VALUE 000000.
77   K                PICTURE 99               VALUE 00.
```

```
77  J                    PICTURE 9          VALUE 0.
77  I                                       PICTURE 999.
77  M-MEAN  PICTURE  99999  VALUE 00000.
77  M-VAR   PICTURE 999999  VALUE 000000.
77  MEAN                                   PICTURE ZZ9.99999.
77  VAR                                    PICTURE ZZ9.99999.
77  DODO                                   PICTURE 999V99999.
77  DUMDUM                                 PICTURE 999V99999.
77  SCRIPT                                 PICTURE 999.
01  VARIABLES.
    02  POINTS   OCCURS 133 TIMES          PICTURE 999.
PROCEDURE DIVISION.
    SORT SORT-FILE ON ASCENDING KEY PROF-SORT,
    INPUT PROCEDURE INITIAL,
    GIVING PROF-FILE.
    STOP RUN.
INITIAL SECTION.
    OPEN INPUT BALLOT-FILE,
         OUTPUT GRAPH-FILE.
    MOVE ZEROES TO VARIABLES.
    MOVE SPACES TO GRAPH-RECORD.
    MOVE '
-   'FREQUENCY DISTRIBUTION OF M' TO GRAPH-RECORD.
    WRITE GRAPH-RECORD AFTER ADVANCING 0 LINES.
    MOVE SPACES TO GRAPH-RECORD.
    MOVE '          0         10        20        30        40
-   '   50        60        70        80        90        100'
    TO GRAPH-RECORD.
    WRITE GRAPH-RECORD AFTER ADVANCING 2 LINES.
    MOVE SPACES TO GRAPH-RECORD.
    MOVE '          OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
-   'OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
-   'OO' TO GRAPH-RECORD.
    WRITE GRAPH-RECORD AFTER ADVANCING 1 LINES.
READ-BALLOT-FILE.
    READ BALLOT-FILE RECORD AT END GO TO COMPLETION.
    DISPLAY 'BALLOD NUM ', NUMBER IN BALLOT-RECORD.
    DISPLAY 'M IN ABOVE REC ', M.
    ADD 1 TO CNTR.
    MOVE 0 TO I.
    PERFORM LOOP THRU LOOPEND M TIMES.
    DISPLAY 'VALUE OF M= ', M.
    ADD 1 TO POINTS (M).
    ADD M TO M-MEAN.
    COMPUTE M-VAR ROUNDED = M * M + M-VAR.
    GO TO READ-BALLOT-FILE.
LOOP.
    ADD 1 TO I.
```

```
           MOVE SPACES TO SORT-RECORD.
           MOVE POPULATION (I) TO PROF-SORT.
           MOVE NUMBER IN BALLOT-RECORD TO BALLOT-SORT.
           MOVE 0 TO VOTE-SORT.
           MOVE 0 TO COMMENT-SORT.
           MOVE CORRESPONDING STATISTICS TO STATISTICS-SORT.
           MOVE M TO M-SORT.
           IF POPULATION (I) IS EQUAL TO ONE
               THEN MOVE 3 TO VOTE-SORT, MOVE COMMENT IN BALLOT-RECORD
               TO COMMENT-SORT, GO TO LOOPEND.
           IF POPULATION (I) IS EQUAL TO TWO
               THEN MOVE 2 TO VOTE-SORT, GO TO LOOPEND.
           IF POPULATION (I) IS EQUAL TO THREE
               THEN MOVE 1 TO VOTE-SORT.
       LOOPEND.
           ADD 1 TO INDEX.
           RELEASE SORT-RECORD.
       GRAPH-ROUTINE.
           MOVE SPACES TO GRAPH-RECORD.
           ADD 1 TO K.
           IF K IS NOT EQUAL TO 10 THEN GO TO GRAPH-CONT.
           MOVE ZERO TO K.
           IF J IS EQUAL TO 9 THEN GO TO GRAPH-CONT.
           ADD 1 TO J.
           MOVE J TO GRAPH (8).
           MOVE '5' TO GRAPH (9).
       GRAPH-CONT.
           MOVE '0' TO GRAPH (10).
           ADD 10, POINTS (I) GIVING SCRIPT.
           MOVE '*' TO GRAPH (SCRIPT).
           WRITE GRAPH-RECORD AFTER ADVANCING 1 LINES.
       COMPLETION.
           MOVE SPACES TO GRAPH-RECORD.
           MOVE 5 TO I.
           PERFORM GRAPH-CONT.
           PERFORM GRAPH-ROUTINE THRU GRAPH-CONT VARYING I FROM 6
           BY 1 UNTIL I IS EQUAL TO 130.
           DISPLAY 'TOTAL INPUT RECORDS     ' CNTR.
           DISPLAY 'TOTAL SORTED RECORDS    ' INDEX.
           DIVIDE CNTR INTO M-MEAN GIVING DODO ROUNDED.
           DIVIDE CNTR INTO M-VAR GIVING DUMDUM ROUNDED.
           COMPUTE DUMDUM ROUNDED = DUMDUM - DODO * DODO.
           MOVE DUMDUM TO VAR.
           MOVE DODO TO MEAN.
           DISPLAY 'M-MEAN          ' MEAN.
           DISPLAY 'M-VAR           ' VAR.
           COMPUTE VAR ROUNDED = DUMDUM ** 0.5.
           DISPLAY 'SDN             ' VAR.
```

```
           CLOSE BALLOT-FILE, GRAPH-FILE.
//GO.SORTPR   DD  SYSOUT=A
//GO.SYSOUT   DD  SYSOUT=A
//GO.SORTLIB  DD DSNAME=SYS1.SORTLIB,DISP=OLD
//GO.SORTWK01 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK02 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK03 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK04 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK05 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK06 DD UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.BALLOT   DD  DSNAME=BALL,UNIT=2400,VOL=SER=NPS148,LABEL=(,SL),      *
//        DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=477,BLKSIZE=1431)
//GO.SORTOUT DD DSNAME=PRO,UNIT=2400,VOL=SER=NPS296,LABEL=(,SL),         *
//    DISP=(NEW,KEEP),DCB=(RECFM=FB,LRECL=22,BLKSIZE=1100)
//GO.GRAPH    DD  SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=3325)
```

PROGRAM 3 SCORSORT

```
//    EXEC   COBFCLG,REGION.GO=125K
//COB.SYSIN    DD  *
       IDENTIFICATION DIVISION.
       PROGRAM-ID. 'SCORSORT'.
       AUTHOR. K.M.EISENHARDT.
       INSTALLATION. NPGS-MONTEREY.
       DATE-WRITTEN. APRIL,1970.
       REMARKS. SCORSORT COMPUTES THE EXCELLENCE SCORE OF EACH PROFESSOR
                AND ORGANIZES THESE RESULTS BY DESCENDING SCORE AND
                DESCENDING NUMBER OF ACQUAINTENCES.
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-360-67.
       OBJECT-COMPUTER. IBM-360-67.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT PROF-FILE ASSIGN TO 'PROF' UTILITY.
           SELECT SCOR-FILE ASSIGN TO 'SCORE' UTILITY.
           SELECT GRAPH-FILE ASSIGN TO 'GRAPH' UTILITY.
       DATA DIVISION.
       FILE SECTION.
       FD  PROF-FILE
           LABEL RECORDS ARE OMITTED
           RECORDING MODE IS F
           BLOCK CONTAINS 50 RECORDS
           RECORD CONTAINS 22 CHARACTERS
           DATA RECORD IS PROF-RECORD.
       01  PROF-RECORD.
           02  FILLER                          PICTURE XXXX.
           02  PROF.
               03  NUMBER                      PICTURE XXX.
               03  VOTE                        PICTURE 9.
               03  COMMENT                     PICTURE 9.
           02  VOTER.
               03  CATEGORY                    PICTURE X.
               03  MILITARY.
                   04  RANK                    PICTURE XX.
                   04  SERVICE                 PICTURE X.
                   04  CURRICULUM              PICTURE XX.
               03  CIVILIAN.
                   04  RANK                    PICTURE XX.
                   04  DEPT                    PICTURE XX.
           02  M-TOTAL                         PICTURE 999.
       FD  SCOR-FILE
           LABEL RECORDS ARE OMITTED
```

```
    RECORDING MODE IS F
    BLOCK CONTAINS 25 RECORDS
    RECORD CONTAINS 133 CHARACTERS
    DATA RECORD ARE SCOR-RECORD, HEADING-RECORD.
01  SCOR-RECORD.
    02  FILLER                                  PICTURE X(6).
    02  PROF                                    PICTURE XXX.
    02  FILLER                                  PICTURE X(10).
    02  CALCULATIONS.
        03  SK                                  PICTURE 9.99999.
        03  FILLER                              PICTURE XXX.
        03  NK                                  PICTURE ZZ9.
        03  FILLER                              PICTURE XXX.
        03  ZK                                  PICTURE ZZ9.
        03  FILLER                              PICTURE XXX.
        03  DK                                  PICTURE ZZ9.
        03  FILLER                              PICTURE X(6).
        03  X1K                                 PICTURE ZZ9.
        03  FILLER                              PICTURE XXX.
        03  X2K                                 PICTURE ZZ9.
        03  FILLER                              PICTURE XXX.
        03  X3K                                 PICTURE ZZ9.
        03  FILLER                              PICTURE X(6).
        03  DIFF                                PICTURE ZZ9.
        03  FILLER                              PICTURE XXX.
        03  ESK                                 PICTURE 9.999.
        03  FILLER                              PICTURE XXX.
        03  SDSK                                PICTURE 9.999.
        03  FILLER                              PICTURE XXX.
        03  QUO                                 PICTURE ----.999.
        03  FILLER                              PICTURE X(32).
01  HEADING-RECORD.
    02  HEADER-FIELDS                           PICTURE X(133).
FD  GRAPH-FILE
    LABEL RECORDS ARE OMITTED
    RECORDING MODE IS F
    BLOCK CONTAINS 25 RECORDS
    RECORD CONTAINS 133 CHARACTERS
    DATA RECORD IS GRAPH-RECORD.
01  GRAPH-RECORD.
    02  GRAPH       OCCURS 133 TIMES            PICTURE X.
SD  SORT-FILE
    RECORDING MODE IS F
    RECORD CONTAINS 45 CHARACTERS
    DATA RECORD IS SORT-RECORD.
01  SORT-RECORD.
    02  PROF-SORT                               PICTURE XXX.
    02  VOTER-SORT.
```

```
        03  CATEGORY-SORT                          PICTURE X.
        03  MILITARY-SORT.
            04  RANK                               PICTURE XX.
            04  SERVICE                            PICTURE X.
            04  CURRICULUM                         PICTURE XX.
        03  CIVILIAN-SORT.
            04  RANK                               PICTURE XX.
            04  DEPT                               PICTURE XX.
    02  SK-SORT                                    PICTURE  9V99999.
    02  NK-SORT                                    PICTURE 999.
    02  ZK-SORT                                    PICTURE 999.
    02  DK-SORT                                    PICTURE 999.
    02  X1K-SORT                                   PICTURE 999.
    02  X2K-SORT                                   PICTURE 999.
    02  X3K-SORT                                   PICTURE 999.
    02  ESK-SORT                                   PICTURE 9V999.
    02  SDSK-SORT                                  PICTURE 9V999.
WORKING-STORAGE SECTION.
77  CNTR                   PICTURE 999999      COMPUTATIONAL-3.
77  INDEX                  PICTURE 999         COMPUTATIONAL-3.
77  DUMMY                  PICTURE 9V999       COMPUTATIONAL-3.
77  DODO                   PICTURE 9999V9999   COMPUTATIONAL-3.
77  DUMDUM                 PICTURE 9999V9999   COMPUTATIONAL-3.
77  DOPEY                                      PICTURE 999.
77  I                                          PICTURE 999.
77  SCRIPT                                     PICTURE 999.
77  MEAN                                       PICTURE ZZZ9.999.
77  VAR                                        PICTURE ZZZ9.999.
77  N-VAR                  PICTURE 999999      VALUE 000000.
77  N-MEAN                 PICTURE 999999      VALUE 000000.
77  K                       PICTURE 99          VALUE 00.
77  J                       PICTURE 9           VALUE 0.
77  WEIGHT-FIRST           PICTURE 9           VALUE 4.
77  WEIGHT-SECOND          PICTURE 9           VALUE 2.
77  WEIGHT-THIRD           PICTURE 9           VALUE 1.
01  GRAPH-AID.
    02  POINTS  OCCURS 500 TIMES               PICTURE 999.
01  IDS.
    02  IDENT                                  PICTURE XXX.
    02  IDENT-NUM   REDEFINES IDENT            PICTURE 999.
01  VARIABLES.
    02  X   OCCURS 4 TIMES                     PICTURE 999.
01  HEADING-FORMAT.
    02  FILLER             PICTURE X(6)        VALUE SPACES.
    02  PROF               PICTURE XXXX        VALUE 'PROF'.
    02  FILLER             PICTURE X(10)       VALUE SPACES.
    02  S                  PICTURE X(7)        VALUE ' SCORE '.
    02  FILLER             PICTURE XXX         VALUE SPACES.
```

```
           02  N                      PICTURE XXX        VALUE 'NK '.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  Z                      PICTURE XXX        VALUE 'ZK '.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  D                      PICTURE XXX        VALUE 'DK '.
           02  FILLER                 PICTURE X(6)       VALUE SPACES.
           02  X1                     PICTURE XXX        VALUE 'X1K'.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  Y                      PICTURE XXX        VALUE 'X2K'.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  Z                      PICTURE XXX        VALUE 'X3K'.
           02  FILLER                 PICTURE X(6)       VALUE SPACES.
           02  DI                     PICTURE XXX        VALUE 'DIF'.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  E                      PICTURE XXX        VALUE 'ESK'.
           02  FILLER                 PICTURE XXXX       VALUE SPACES.
           02  SDS                    PICTURE X(5)       VALUE 'SDSK '.
           02  FILLER                 PICTURE XXX        VALUE SPACES.
           02  Q                      PICTURE X(5)       VALUE 'QUOT '.
           02  FILLER                 PICTURE X(34)      VALUE SPACES.
       PROCEDURE DIVISION.
           SORT SORT-FILE ON DESCENDING KEY SK-SORT,
           DESCENDING KEY NK-SORT,
           INPUT PROCEDURE INITIAL,
           OUTPUT PROCEDURE FINISH.
           STOP RUN.
       INITIAL SECTION.
           OPEN INPUT PROF-FILE,
           OUTPUT GRAPH-FILE, SCOR-FILE.
           MOVE ZEROES TO GRAPH-AID.
           MOVE ZERO TO CNTR.
           MOVE ZERO TO INDEX.
       PRINT-GRAPH-HEADING-AND-GRID.
           MOVE SPACES TO GRAPH-RECORD.
           MOVE '
      -    'FREQUENCY DISTRIBUTION OF NK' TO GRAPH-RECORD.
           WRITE GRAPH-RECORD AFTER ADVANCING 0 LINES.
           MOVE SPACES TO GRAPH-RECORD.
           MOVE '          0         10        20        30        40
      -    '    50' TO GRAPH-RECORD.
           WRITE GRAPH-RECORD AFTER ADVANCING 2 LINES.
           MOVE SPACES TO GRAPH-RECORD.
           MOVE '          OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
      -    'OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
      -    'OO' TO GRAPH-RECORD.
           WRITE GRAPH-RECORD AFTER ADVANCING 1 LINES.
       READ-INITIAL-PROF-RECORD.
           READ PROF-FILE RECORD AT END GO TO COMPLETION.
```

```
           ADD 1 TO CNTR.
           MOVE ZEROES TO SORT-RECORD.
           MOVE ZEROES TC VARIABLES.
           MOVE NUMBER TO IDENT.
           GO TO INTERMEDIATE-CALCULATIONS.
READ-PROF-FILE.
           READ PROF-FILE RECORD AT END GO TO COMPLETION.
           ADD 1 TO CNTR.
           IF NUMBER IS NOT EQUAL TO IDENT GO TO RESULT-CALCULATIONS.
INTERMEDIATE-CALCULATIONS.
           ADD COMMENT TO DK-SORT.
           ADD 1 TO NK-SORT
           IF VOTE IS EQUAL TO 3 ADD WEIGHT-FIRST TO ZK-SORT.
           IF VOTE IS EQUAL TO 2 ADD WEIGHT-SECCND TO ZK-SORT.
           IF VOTE IS EQUAL TO 1 ADD WEIGHT-THIRD TO ZK-SORT.
           ADD 1 TO VOTE.
           ADD 1 TO X (VOTE).
           DIVIDE M-TOTAL INTO 1.0 GIVING DUMMY RCUNDED.
           ADD DUMMY TO ESK-SORT.
           COMPUTE SDSK-SORT ROUNDED = DUMMY ** 2 + SDSK-SORT.
           GO TO READ-PROF-FILE.
RESULT-CALCULATIONS.
           DIVIDE NK-SORT INTO ZK-SORT GIVING SK-SORT ROUNDED.
           MOVE X (4) TO X1K-SORT.
           MOVE X (3) TO X2K-SORT.
           MOVE X (2) TO X3K-SORT.
           COMPUTE SDSK-SCRT ROUNDED = (14 * ESK-SORT - 36 * SDSK-SORT)
           / (NK-SORT ** 2).
           COMPUTE SDSK-SORT ROUNDED = SDSK-SORT ** .5.
           MULTIPLY 6.0 BY ESK-SORT ROUNDED.
           DIVIDE NK-SORT INTC ESK-SORT ROUNDED.
RELEASE-TO-SORT.
           MOVE IDENT TO PROF-SORT.
           MOVE VOTER TO VOTER-SORT.
           ADD 1, NK-SORT GIVING DOPEY.
           ADD 1 TO POINTS (DOPEY).
           RELEASE SORT-RECORD.
           ADD 1 TO INDEX.
ZERO-RESULTS.
           MOVE ZEROES TO SCRT-RECORD.
           MOVE ZEROES TC VARIABLES.
           MOVE NUMBER TO IDENT.
           GO TO INTERMEDIATE-CALCULATIONS.
GRAPH-ROUTINE.
           MOVE SPACES TO GRAPH-RECORD.
           ADD 1 TO K.
           IF K IS NOT EQUAL TO 10 THEN GO TO GRAPH-CONT.
           MOVE ZERO TO K.
```

```
    IF J IS EQUAL TO 9 THEN GO TO GRAPH-CONT.
    ADD 1 TO J.
    MOVE J TO GRAPH (8).
    MOVE '0' TO GRAPH (9).
GRAPH-CONT.
    MOVE '0' TO GRAPH (10).
    ADD 10, POINTS (I) GIVING SCRIPT.
    MOVE '*' TO GRAPH (SCRIPT).
    WRITE GRAPH-RECORD AFTER ADVANCING 1 LINES.
COMPLETION.
    DISPLAY 'NUMBER OF RECORDS ON PROF-FILE          ' CNTR.
    DISPLAY 'NUMBER OF RECORDS RELEASED TO SORT      ' INDEX.
    PERFORM GRAPH-ROUTINE THRU GRAPH-CONT VARYING I FROM 2
    BY 1 UNTIL I IS EQUAL TO 500.
    CLOSE GRAPH-FILE, PROF-FILE.
FINISH SECTION.
    MOVE ZERO TO INDEX.
    MOVE ZERO TO CNTR.
    MOVE ZERO TO DOPEY.
    MOVE HEADING-FORMAT TO HEADER-FIELDS.
    WRITE HEADING-RECORD AFTER ADVANCING 0 LINES.
RETURN-SORT-FILE.
    IF CNTR IS EQUAL TO 75 THEN PERFORM HEADER-ROUTINE.
    IF CNTR IS EQUAL TO 150 THEN PERFORM HEADER-ROUTINE.
    IF CNTR IS EQUAL TO 225 THEN PERFORM HEADER-ROUTINE.
    RETURN SORT-FILE AT END GO TO WRAPUP.
    ADD 1 TO INDEX.
    MOVE SPACES TO SCOR-RECORD.
    MOVE PROF-SORT TO PROF IN SCOR-RECORD.
    MOVE SK-SORT TO SK.
    MOVE NK-SORT TO NK.
    MOVE ZK-SORT TO ZK.
    MOVE DK-SORT TO DK.
    MOVE X1K-SORT TO X1K.
    MOVE X2K-SORT TO X2K.
    MOVE X3K-SORT TO X3K.
    MOVE ESK-SORT TO ESK.
    MOVE SDSK-SORT TO SDSK.
    SUBTRACT X1K-SORT, X2K-SORT, X3K-SORT FROM NK-SORT GIVING
    DIFF.
    IF SDSK-SORT IS EQUAL TO 0 THEN ADD 1 TO DOPEY, GO TO
    WRITE-RECORD.
    COMPUTE QUO ROUNDED = (SK-SORT - ESK-SORT) / SDSK-SORT.
WRITE-RECORD.
    ADD NK-SORT TO N-MEAN.
    COMPUTE N-VAR ROUNDED = NK-SORT * NK-SORT + N-VAR.
    WRITE SCOR-RECORD AFTER ADVANCING 1 LINES.
    ADD 1 TO CNTR.
```

```
            GO TO RETURN-SORT-FILE.
        HEADER-ROUTINE.
            MOVE SPACES TO HEADER-FIELDS.
            MOVE HEADING-FORMAT TO HEADER-FIELDS.
            WRITE HEADING-RECORD AFTER ADVANCING 0 LINES.
        WRAPUP.
            DISPLAY 'NUMBER OF RECORDS RETURNED FROM SORT    ' INDEX.
            DISPLAY 'NUMBER OF RECORDS PRINTED               ' CNTR.
            DISPLAY '                    '.
            DISPLAY '                    '.
            DISPLAY '                    '.
            SUBTRACT DOPEY FROM CNTR.
            DIVIDE CNTR INTO N-MEAN GIVING DODO ROUNDED.
            DIVIDE CNTR INTO N-VAR GIVING DUMDUM ROUNDED.
            COMPUTE DUMDUM ROUNDED = DUMDUM - DODO * DODO.
            MOVE DUMDUM TO VAR.
            MOVE DODO TO MEAN.
            DISPLAY 'N-MEAN          ' MEAN.
            DISPLAY 'N-VAR           ' VAR.
            COMPUTE VAR ROUNDED = DUMDUM ** 0.5.
            DISPLAY 'SDN             ' VAR.
            CLOSE SCOR-FILE.
//GO.SORTPR DD SYSOUT=A
//GO.SORTLIB DD DSNAME=SYS1.SORTLIB,DISP=OLD
//GO.SORTWK01   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK02   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK03   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK04   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK05   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.SORTWK06   DD  UNIT=SYSDA,SPACE=(TRK,(20),,CONTIG)
//GO.PROF    DD DSNAME=PRO,UNIT=2400,VOL=SER=NPS296,LABEL=(,SL),          *
//     DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=22,BLKSIZE=1100)
//GO.SCORE     DD    SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=3325)
//GO.GRAPH  DD  SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=3325)
```

PROGRAM 4 DOMINANCE

```
//  EXEC WATFORG
//SYSIN DD *
$JOB  (2566.0292.ROX1).'DI MAURO'
C     THIS PROGRAM MAKES BOTH AN ABSOLUTE AND COMPLETE DOMINANCE TEST
C     FOR EACH OF THE PROFESSORS READ IN. THE PRINTOUT SHOWS A ZERO UNDER
C     THE AD COLUMN IF THE PROFESSOR IS NOT ABSOLUTELY DOMINATED. OTHER-
C     WISE A ONE IS PLACED UNDER THE AD COLUMN. THE COMPLETE DOMINANCE
C     COLUMN HAS THE SAME NOTATION FOR COMPLETE DOMINANCE RESULTS FOR
C     EACH PROFESSOR.
      DIMENSION PROF(50),V1K(50),V2K(50),V3K(50)
      INTEGER PROF
      WRITE (6,7)
    7 FORMAT ('1',11X,'PROF',7X,'V1K',7X,'V2K',7X,'V3K',5X,
     *4X,'AD',8X,'CD'///)
C
C   READ NO OF PROFS TO BE READ
C
      READ (5,3) NOPROF
    3 FORMAT (I5)
      IF (NOPROF.GT.50) GO TO 10
C
C   READ INFORMATION FOR EACH PROF
C
      DO 1 I=1,NOPROF
    1 READ (5,2) PROF(I),V1K(I),V2K(I),V3K(I)
    2 FORMAT (I10,3F10.5)
      DO 9 I = 1,NOPROF
      ICDOM = 1
      IADOM = 1
C
C   TESTS FOR COMPLETE DOMINANCE
C
      DO 5 J = 1,NOPROF
      IF (I.EQ.J) GO TO 5
      IF (V3K(I).EQ.V3K(J)) GO TO 11
      Y = (V2K(J)-V2K(I) + V1K(J) - V1K(I))/(V3K(I)-V3K(J))
      IF((V3K(I).LT.V3K(J).AND.V1K(I).LT.V1K(J).AND.Y.LT.0.0).OR.
     *(V3K(I).GT.V3K(J).AND.V1K(I).LT.V1K(J).AND.Y.GT.1.0)) GO TO 4
      GO TO 5
   11 Y = (V2K(J)-V2K(I))/(V1K(I)-V1K(J))
      IF(V1K(J).LT.V1K(I).AND.Y.LT.1.0) GO TO 4
      IF(V1K(J).EQ.V1K(I).AND.V2K(J).GT.V2K(I)) GO TO 4
    5 CONTINUE
      ICDOM = 0
C
```

```
C
    4 WRITE(6,537) I,J,Y
  537 FORMAT(9X,I5,5X,I5,F10.6)
C
C    TESTS FOR ABSOLUTE DOMINANCE
C
      DO 8 J=1,NOPROF
      IF (I.EQ.J) GO TO 8
      IF (V1K(J).GT.V1K(I).AND.V2K(J).GT.V2K(I).AND.
     *V3K(J).GT.V3K(I)) GO TO 9
    8 CONTINUE
      IADOM=0
    9 WRITE (6,6) PROF(I), V1K(I),V2K(I),V3K(I),IADOM,ICDOM
    6 FORMAT (5X,I10,2X,3F10.5,2I10)
   10 STOP
      END
```

PROGRAM 5 PAIRED COMPARISONS

```
//  EXEC  FORTCLG,PARM.FORT='LIST,SOURCE,NODECK,MAP',                    *
//    REGION.GO=175K,TIME.GO=2
//FORT.SYSIN DD *
C   THIS PROGRAM COMPARES THE SCORES OF THE ITH PROFESSOR AGAINST
C   THAT OF THE JTH PROFESSOR WITH THE CONSTRAINT THAT EACH OF
C   THESE PROFESSORS IS KNOWN BY A GIVEN VOTER.
C
C
      DIMENSION NK(20),ALPHA(20,20),BETA(20,20),SCORE(20,20),FILLER(4)
      DIMENSION FRACT(20,20,3),XIK(20,20,3)
      INTEGER BALLOT (20,240),VOTE(20,240),PROF(20),B,P,V
      INTEGER ROF(20)
      INTEGER ONE,TWO,THREE
C
C   N IS THE NUMBER OF PROFESSORS TO BE COMPARED.
C   NN IS THE MAXIMUM VALUE OF NK AMONG THE N PROFESSORS.
C   NNN IS THE NUMBER OF PLACE VOTES.
C
      READ (5,1) N,NN,NNN
    1 FORMAT (3I5)
      WRITE (6,61) N,NN,NNN
   61 FORMAT (10X,3I5)
C
C   READ WEIGHTS FOR VOTES.
C
      READ (5,51) ONE,TWO,THREE
   51 FORMAT (3I5)
      WRITE (6,51) ONE,TWO,THREE
C
C   READ PROFESSOR NUMBER IN ASCENDING ORDER.
C
      READ (5,101) (ROF(I),I=1,N)
  101 FORMAT (I5)
      WRITE (6,101) (ROF(I),I=1,N)
C
C   READ NK AND PROFESSOR IN DESIRED ORDER OF OUTPUT (USUALLY ORDERED
C   BY DESCENDING SCORE).
C
      DO 2 I=1,N
      READ (5,3) NK(I),PROF(I)
    3 FORMAT (2I5)
    2 CONTINUE
      WRITE (6,41) (PROF(I), I=1,N)
C
C   ZERO MATRICES
```

```
C
      DO 13 I=1,N
      DO 13 J=1,N
      ALPHA(I,J)=0.0
      BETA(I,J)=0.0
      SCORE(I,J)=0.0
      DO 13 K=1,NNN
      XIK(I,J,K)=0.0
   13 FRACT(I,J,K)=0.0
      DO 15 I=1,N
      DO 15 J=1,NN
      BALLOT (I,J)=0
   15 VOTE (I,J)=0
      K=0
C
C    READ PROF FILE AND SEARCH PROFESSOR NUMBER FIELD.
C
    4 K=K+1
    6 READ (8,5) B,P,V,FILLER(1),FILLER(2),FILLER(3),FILLER(4)
    5 FORMAT (I4,I3,I1,3A4,A2)
      IF (P.NE.ROF(K)) GO TO 6
      DO 100 I=1,N
      IF (ROF(K).NE.PROF(I)) GO TO 100
      BALLOT(I,1)=B
      VOTE (I,1)=V
      M=NK(I)
C
C    READ REMAINING RECORDS FOR A GIVEN PROFESSOR.
C
      DO 7 J=2,M
      READ (8,5) BALLOT(I,J),PROF(I),VOTE(I,J),
     1FILLER(1),FILLER(2),FILLER(3),FILLER(4)
    7 CONTINUE
  100 CONTINUE
      IF (K.NE.N) GO TO 4
C
C    APPLY WEIGHT FACTORS TO EACH VOTE.
C
      DO 52 I=1,N
      DO 52 J=1,NN
      IF (VOTE(I,J).EQ.1) GO TO 53
      IF (VOTE(I,J).EQ.2) GO TO 54
      IF (VOTE(I,J).EQ.3) GO TO 55
      GO TO 52
   53 VOTE(I,J)=THREE
      GO TO 52
   54 VOTE(I,J)=TWO
      GO TO 52
```

```
   55 VOTE(I,J)=ONE
   52 CONTINUE
      L=N-1
C
C     COMPUTE COMPARISON NK, ZK, AND XIK FOR EACH PROFESSOR.
C
      DO 10 I=1,L
      K=I+1
      DO 10 II=K,N
      M=NK(I)
      MM=NK(II)
      DO 12 J=1,M
      DO 12 JJ=1,MM
      IF (BALLOT(I,J).NE.BALLOT(II,JJ)) GO TO 12
      WRITE (6,75) BALLOT(I,J)
   75 FORMAT (10X,I4)
      ALPHA(I,II)=ALPHA(I,II)+1
      ALPHA(II,I)=ALPHA(II,I)+1
      BETA(I,II)=VOTE(I,J)+BETA(I,II)
      BETA(II,I)=VOTE(II,JJ)+BETA(II,I)
      IF (VOTE(I,J).EQ.ONE) GO TO 62
      IF (VOTE(I,J).EQ.TWO) GO TO 63
      IF (VOTE(I,J).EQ.THREE) GO TO 64
      GO TO 65
   62 XIK(I,II,1)=XIK(I,II,1)+1
      GO TO 65
   63 XIK(I,II,2)=XIK(I,II,2)+1
      GO TO 65
   64 XIK(I,II,3)=XIK(I,II,3)+1
   65 IF (VOTE(II,JJ).EQ.ONE) GO TO 66
      IF (VOTE(II,JJ).EQ.TWO) GO TO 67
      IF (VOTE(II,JJ).EQ.THREE) GO TO 68
      GO TO 69
   66 XIK(II,I,1)=XIK(II,I,1)+1
      GO TO 69
   67 XIK(II,I,2)=XIK(II,I,2)+1
      GO TO 69
   68 XIK(II,I,3)=XIK(II,I,3)+1
   69 CONTINUE
   12 CONTINUE
   10 CONTINUE
C
C     COMPUTE COMPARISON FRACTIONS OF PLACE VOTES.
C
      DO 70 I=1,N
      DO 70 II=1,N
      IF (ALPHA(I,II).EQ.0.0) GO TO 70
      DO 74 K=1,NNN
```

```
   74 FRACT(I,II,K)=XIK(I,II,K)/ALPHA(I,II)
   70 CONTINUE
C
CC    COMPUTE COMPARISON SCORE.
C
      DO 20 I=1,N
      DO 20 II=1,N
      IF (ALPHA(I,II).EQ.0.0) GO TO 20
      SCORE (I,II)=BETA(I,II)/ALPHA(I,II)
   20 CONTINUE
C
CC    WRITE RESULTS.
C
      DO 50 I=1,N
      WRITE (6,30)
   30 FORMAT ('1',50X,'PAIRED COMPARISONS OF FACULTY MEMBERS')
      WRITE (6,40)
   40 FORMAT (////10X,'PROF',6X,'NK',8X,'BALLOT',4X,'VOTE',4X)
      WRITE (6,41) NK(I)
   41 FORMAT (/20X,I3)
      M=NK(I)
      DO 50 J=1,M
      WRITE (6,42) BALLOT(I,J),VOTE(I,J)
   42 FORMAT (30X,I4,6X,I1)
   50 CONTINUE
      WRITE (6,34)
   34 FORMAT ('1',57X,'N MATRIX'//)
      WRITE (6,35) ((ALPHA(I,II),II=1,N),I=1,N)
   35 FORMAT (/20(2X,F4.0))
      WRITE (6,36)
   36 FORMAT ('1',57X,'Z MATRIX'//)
      WRITE (6,35) ((BETA(I,II),II=1,N),I=1,N)
      WRITE (6,37)
   37 FORMAT ('1',55X,'SCORE MATRIX'//)
      WRITE (6,38) ((SCORE(I,II),II=1,N),I=1,N)
   38 FORMAT (/20(2X,F4.2))
      WRITE (6,71)
   71 FORMAT ('1',53X,'FRACTION MATRIX'//)
      DO 73 I=1,N
      DO 73 II=1,N
      WRITE (6,72) I,II,(FRACT(I,II,K),K=1,NNN)
   72 FORMAT (//10X,I2,'VS.',I2/10X,3(F10.5,5X))
   73 CONTINUE
      STOP
      END
//GO.FT06F001 DD SYSOUT=A,SPACE=(CYL,(8,3))
//GO.FT08F001   DD  DSNAME=PRO,UNIT=2400,VOL=SER=NPS296,LABEL=(,SL),    *
//    DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=22,BLKSIZE=1100)
```

APPENDIX C

RANK-ORDERED ITEMS OF STUDENT EVALUATION

		$B_i r_{ic}$
1.	Interprets abstract ideas and theories clearly	.038
2.	Gets students interested in his subject.	.037
3.	Has increased my skills in thinking.	.034
4.	Has helped broaden my interests.	.031
5.	Stresses important material.	.030
6.	Makes good use of examples and illustrations.	.030
7.	Motivated me to do my best work.	.029
8.	Inspires class confidence in his knowledge of the subject.	.029
9.	Has given me viewpoints or appreciations.	.029
10.	Is clear and understandable in his explanations.	.028
11.	Seems to enjoy teaching.	.028
12.	Has presented many thought-provoking ideas.	.028
13.	Has given me new tools for attacking problems.	.028
14.	Has made the course sufficiently difficult to be stimulating.	.026
15.	Keeps the balance between discussion and lecture well suited to this type of course.	.022
16.	Teaches near the class level.	.022
17.	Has an adequate speaking voice.	.022
18.	Makes the course practical.	.022
19.	Shows interest and enthusiasm in his subject.	.022
20.	Controls class discussion to prevent rambling and confusion.	.020
21.	Has maintained an atmosphere of good feeling in the class.	.020

		$B_i r_{ic}$
22.	Gives well organized lectures.	.019
23.	Encourages initiative on the part of the students.	.018
24.	Has a good sense of humor.	.018
25.	Has been well prepared for each day's lecture.	.017

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13. ABSTRACT

The purpose of this thesis was to present the procedure and techniques used to select the fourth annual recipient of the Rear Admiral John J. Shieffelin Award for Excellence in Teaching. The data and results were analyzed and compared with the results from the previous year. Findings indicate that the best teacher in each of the eleven academic departments is being selected but that distribution of the eleven within the top twenty positions occurs randomly.

Recommendations were made for changes in the present system should it continue in use and an additional recommendation was made for the adoption of a new method of selection based on the use of student questionnaires.

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